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THE UNITED STATES OF AMERICA

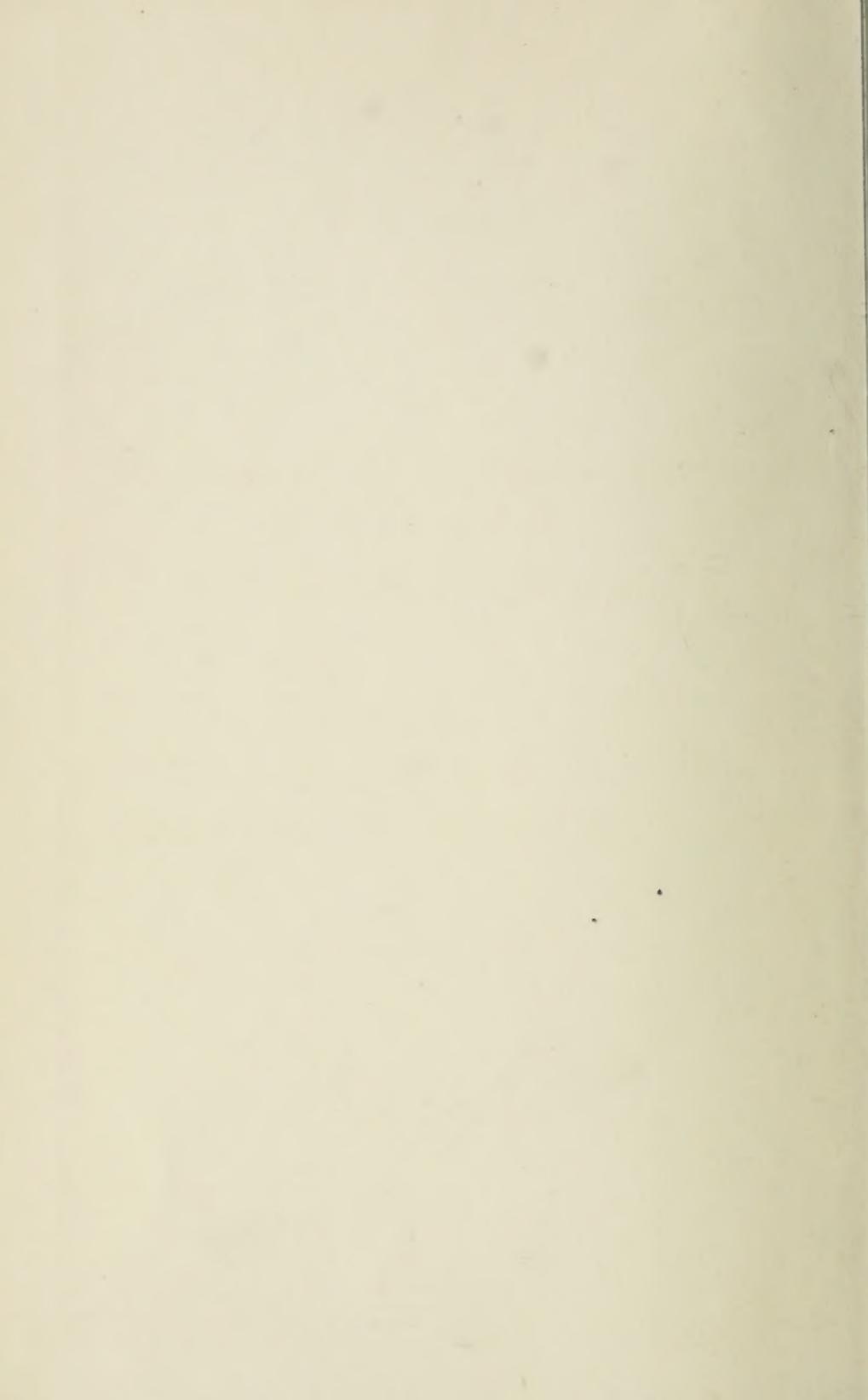
ILLINOIS



DOUGLAS C. RIDGLEY



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Regional Geographies of the United States
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EDITED BY J. PAUL GOODE

THE GEOGRAPHY OF ILLINOIS

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THE GEOGRAPHY OF ILLINOIS

By

DOUGLAS C. RIDGLEY



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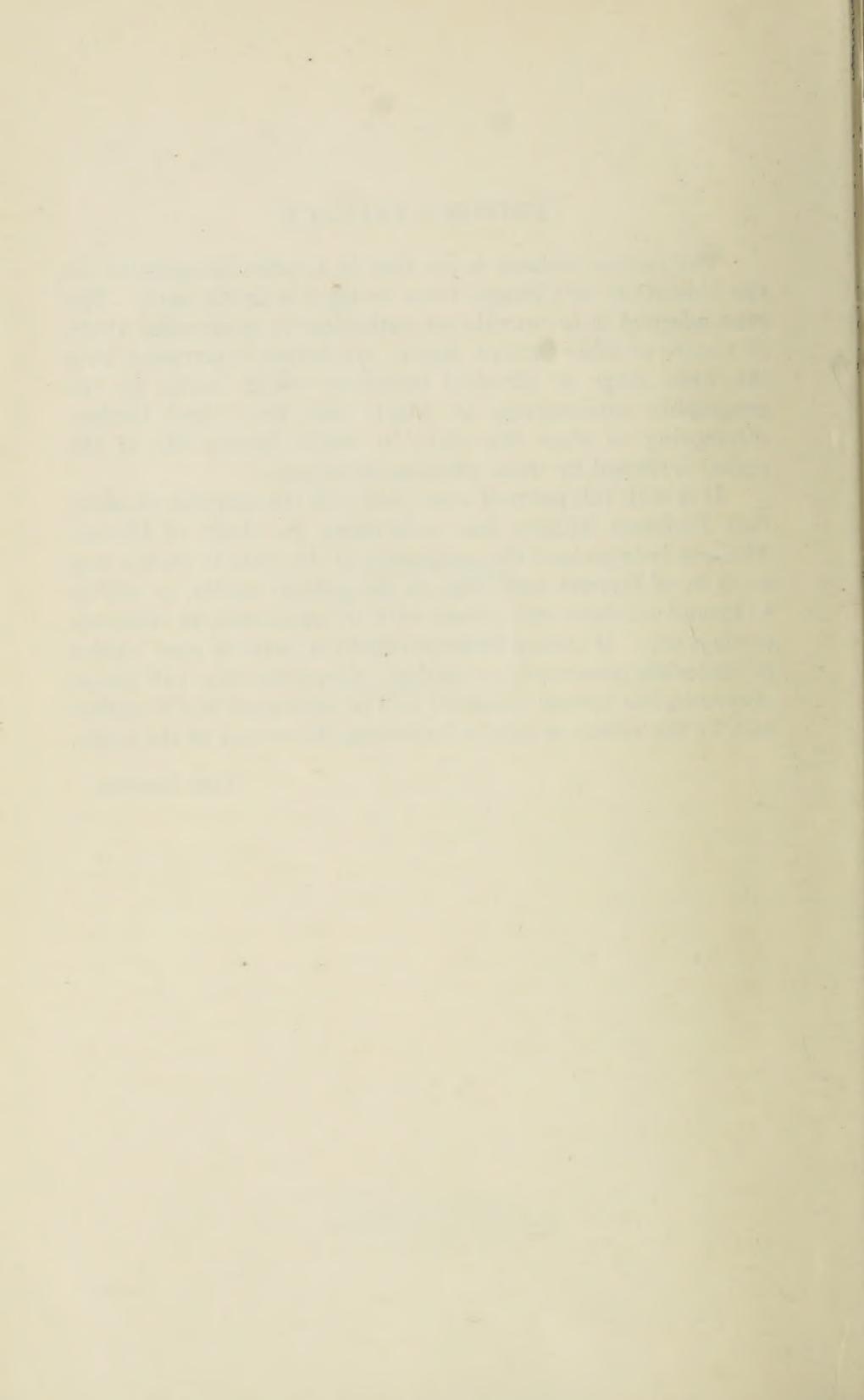
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EDITOR'S PREFACE

The present volume is the first in a series inaugurated by the University of Chicago Press to fill a long-felt need. The plan adopted is to provide an authoritative geographic study of a state or other limited region, presenting in compact form the wide range of physical influences which make up the geographic environment in which men live. And further, attempting to show the ways in which human life in the region is shaped by these physical influences.

It is with this point of view, and with this purpose in mind, that Professor Ridgley has undertaken the study of Illinois. The aim is to present the geography of the state in such a way as to be of interest and value to the general reader, as well as to furnish teachers and schools with an ample text for reference or class use. It cannot be hoped that the point of view, choice of materials presented, or method of presentation will please everyone, but critical comment will be welcomed by the author and by the editor as aids in furthering the service of the series.

THE EDITOR



AUTHOR'S PREFACE

The geography of Illinois as a state has received treatment in the past only in the state supplements of the geography textbooks. A large amount of material bearing directly on the geography of the state has been published, however, in numerous bulletins and reports of the various state departments as indicated in the bibliography given in this volume. The geography of selected areas has been presented in full detail in the educational bulletins of the State Geological Survey. The reader will find among the references listed in the bibliography a wealth of material with which to continue a study of the state and its resources as fully as may be desired.

This volume attempts to present the geography of Illinois as a whole so that the reader may appreciate the resources of the state and understand how man has used them. The natural features and natural resources of the state are treated in some detail. The great occupations of mankind—agriculture, mining, manufacturing, transportation, and trade—are discussed with sufficient fulness to give an adequate idea of their development and present importance within the state. The population census of 1920 for Illinois is treated in a final chapter. The book is designed to be of interest to the busy citizen who wishes to know his state as a unit in its present-day activities; to teachers and pupils who would know Illinois well enough to interpret other regions in comparison with the home state; to all who wish to learn the reasons for the high rank of Illinois in many lines of human endeavor.

Copy for the maps and graphs was prepared and the pictures selected by Miss Eunice R. Blackburn under the direction of Dr. Goode, the editor. The Index is the work of Miss Mabel Crompton.

The author wishes to acknowledge his indebtedness to the various departments of the state government, the local United States Weather Bureau office at Springfield, the Agricultural College of the University of Illinois, and the Bureau of the

United States Census for recent data furnished for use in the various chapters. Numerous maps, graphs, and recent facts of the volume are due to their cordial interest and co-operation.

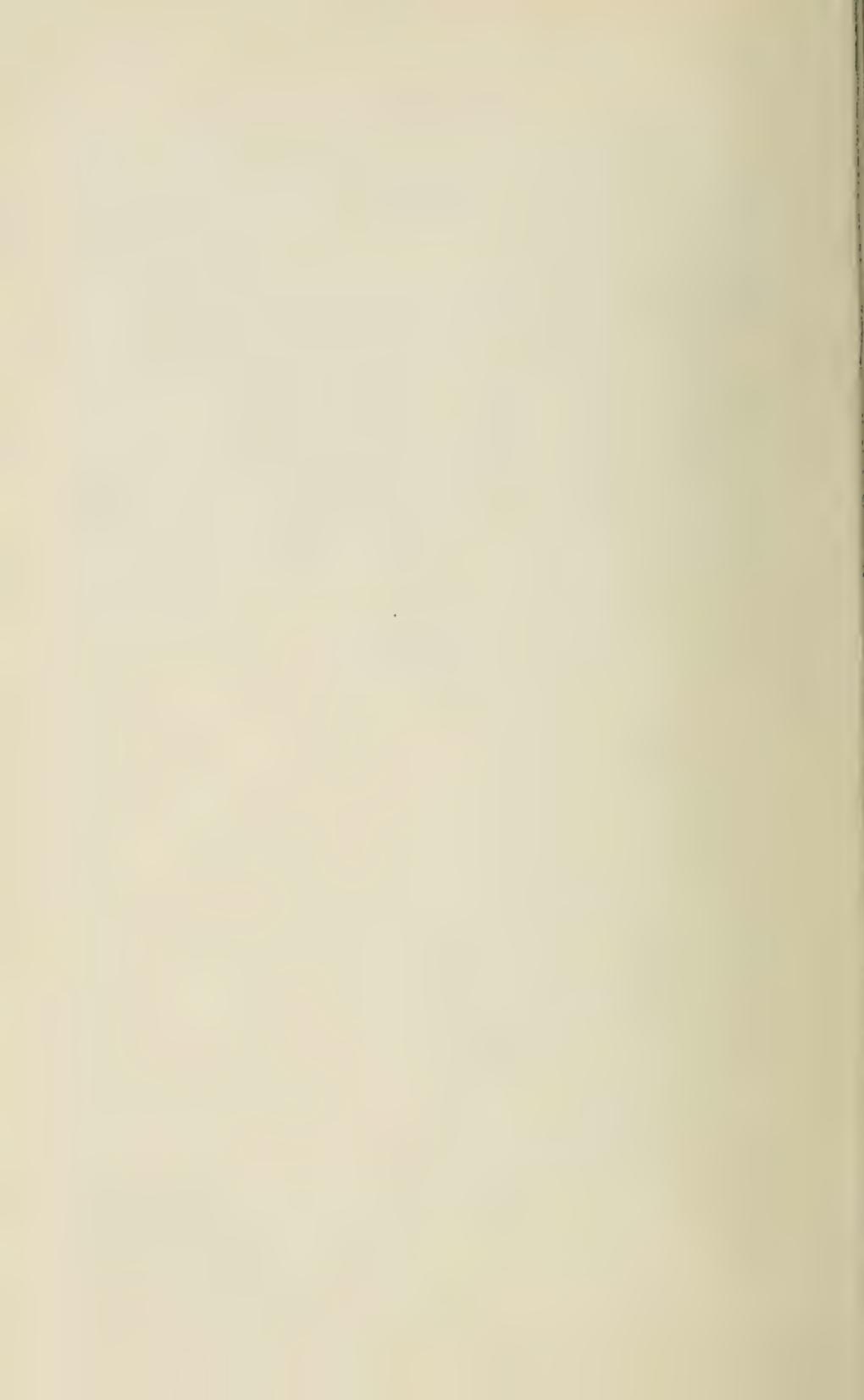
Acknowledgment is also due to Mr. Robert Ridgway for the use of photographs of southern Illinois which he has accumulated through a long series of years; to Dr. Wellington D. Jones for the use of photographs gathered in his field studies of northeastern Illinois; to the Keystone View Co. for photographs taken throughout the state; and to numerous friends who have contributed through photograph, or letter, or personal conference to the preparation of the volume.

The work has been prepared under the guidance and direction of Dr. J. Paul Goode, editor of the series of "Regional Geographies of the United States of America," of which this is the first volume to appear. His kindly assistance and helpful advice in the preparation of the manuscript are gratefully acknowledged.

DOUGLAS C. RIDGLEY

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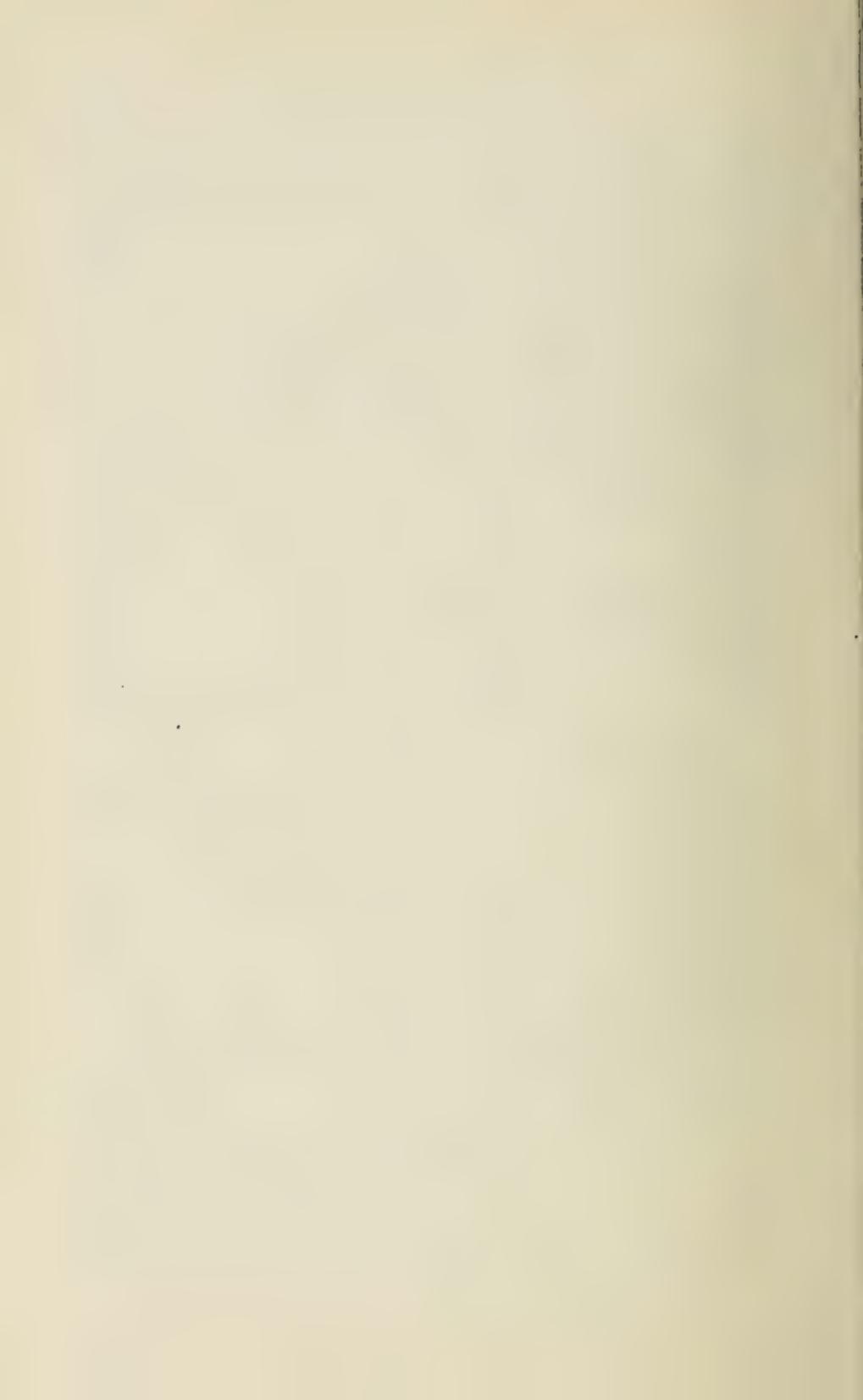
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CHAPTER I

THE ILLINOIS COUNTRY

The name and its meaning.—The Indians who lived in the Illinois country called themselves the “Illini,” meaning “men.” The name *Illinois*, derived from this Indian name, was first applied to the tribe, then to the region in which the Illini lived. The region first known as the Illinois country was of indefinite boundaries but included, in general, the present state of Illinois and portions of Indiana and Wisconsin.

When, in 1809, Illinois Territory was organized as a separate political unit, the name Illinois became applicable to a definite geographic region, including the present states of Illinois and Wisconsin and portions of Minnesota and Michigan.

In 1818, when Illinois State was carved out of Illinois Territory, the northern boundary of the Illinois country was shifted from the Canadian line to the parallel of 42° 30' N. lat., although the Enabling Act gave the constitutional convention specific permission to include all of Illinois Territory within the limits of the state. Thus, with the admission of Illinois, the twenty-first state, into the Union on December 3, 1818, the name Illinois acquired definite and final meaning.

It is interesting to note that Congress fixed the name Illinois in the act establishing Illinois Territory in 1809, while in the Enabling Act of 1818 “the inhabitants of the territory of Illinois are authorized to form for themselves a Constitution and State government, and to assume such name as they shall deem proper.” The name Illinois, which had been so closely associated with the region for 145 years, was, of course, selected as the name of the new state.

Illinois Territory.—The boundaries of Illinois Territory were those established by the Ordinance of 1787, in which provision was made for three states within the Northwest Territory. The westernmost of these three states was to be bounded on the north by Canada; on the east by the Wabash River and a line running due north from Vincennes, Indiana, to Canada; on

the south by the Ohio River; and on the west by the Mississippi River and a line running from the Mississippi to the Lake of the Woods.

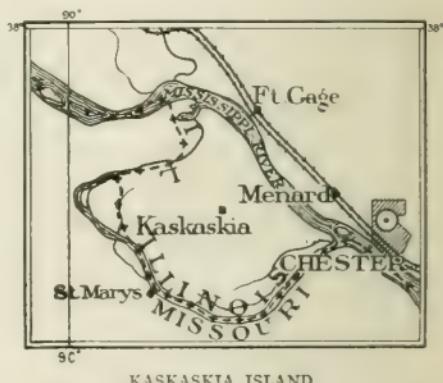
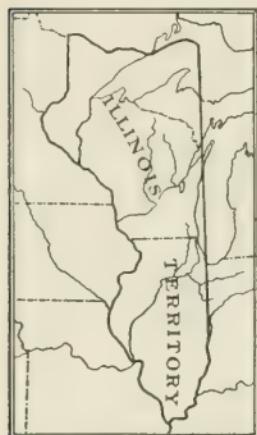
These boundaries became those of Illinois Territory in 1809. The area of this region is two and a half times the area of the state of Illinois, and the population in 1910 was about one and a half times that of Illinois.

Legal state boundaries.—The Enabling Act passed by Congress, April 18, 1818, marks out the boundary lines of the proposed new state of Illinois as follows: The eastern boundary is the middle of the Wabash River and the Indiana state line to the northwest corner of Indiana. Here the line turns east along the northern boundary of Indiana to the middle of Lake Michigan; it then turns north along the middle of the lake to $42^{\circ} 30'$ N. lat.

MAP OF ILLINOIS TERRITORY

Illinois Territory existed from its organization in 1809 to the admission of Illinois as a state in 1818. Its area was $2\frac{1}{2}$ times that of the present state of Illinois

The northern boundary extends westward from the middle of Lake Michigan along $42^{\circ} 30'$ N. lat. to the middle of the Mississippi River. The western boundary is the middle of the Mississippi River to the junction of the Ohio. The southern boundary is along the northwest shore of the Ohio River, for the Kentucky boundary along the Ohio had already been established on the north side of the river. It thus happens that the Ohio River and its islands are in Kentucky, not in Illinois, Indiana, or Ohio.



KASKASKIA ISLAND

The former course of the Mississippi River was along the great curve to the west of Kaskaskia Island. The cut-off which was formed in 1881 has transferred part of Illinois to the *west* of the Mississippi. The site of the original Kaskaskia settlement is now beneath the waters of the Mississippi.

An interesting provision of the Enabling Act follows the description of the state boundaries. It states that the Constitutional Convention "shall ratify the boundaries aforesaid; otherwise they shall be and remain as now prescribed." Had the Convention taken advantage of this provision, Illinois would have had an area of about 150,000 square miles and a population in 1910 of approximately 8,800,000. Milwaukee, St. Paul, Duluth, Superior, Madison, and other well-known cities of other states would be listed among the cities of Illinois. Its north-south extent would have been 850 miles, a greater length than that of any present state. The state would have ranked *first* in the Union in many items in which it now takes lower rank.

Actual state boundaries.—After state boundaries have been described they must be surveyed and marked. Where the



MAP SHOWING THE BOUNDARY LINE IN LAKE MICHIGAN

The southern portion of Lake Michigan is divided among three states—Indiana, Illinois, and Michigan. The entrance to Calumet Harbor is in Indiana instead of Illinois.

boundary line follows a parallel or a meridian the survey may not be so exact as to follow the proposed line with absolute accuracy. The Illinois-Wisconsin boundary line is legally $42^{\circ} 30' N.$ lat. The survey of this line varies somewhat from the true parallel. The state line at the shore of Lake Michigan is about one-half mile *south*, and at the Mississippi River about one-half mile *north*, of the parallel.

Where the middle of a river forms the boundary line between two states, the center of the main current continues to be the boundary if the channel shifts imperceptibly; but if the river

suddenly changes its course or deserts its original channel the boundary remains in the middle of the deserted channel. This is strikingly illustrated in Randolph County at the junction of the Mississippi and Kaskaskia rivers.

In April, 1881, the Mississippi River broke across the narrow peninsula between the Mississippi and Kaskaskia rivers and established a new channel. The site of Old Kaskaskia was destroyed, and Kaskaskia Island was established between the new main channel and the old deserted channel, as shown on the map on page 2. It thus happens that about twenty-five square miles of Randolph County, Illinois, lie on the west side of the Mississippi River and the Mississippi flows *across* Illinois for a distance of eight miles. The inhabitants of Illinois living on Kaskaskia Island are served by rural mail delivery from St. Marys, Missouri.

Smaller cut-offs have been formed by the Wabash River along the border of White County, Illinois, whereby the main channel of the Wabash crosses Indiana for short distances and small areas of Indiana now lie *west* of the Wabash River.

Latitude and longitude.—The southernmost point of Illinois is at the junction of the Mississippi and Ohio rivers in $36^{\circ} 59'$ N. lat. The northern boundary of the state is in $42^{\circ} 30'$ N. lat. The north-south extent of the state is therefore $5\frac{1}{2}$ degrees of latitude, or 385 miles.

The parallel of 40° N. lat. crosses the widest portion of the state and divides Illinois into two approximately equal areas. This central parallel passes just north of Quincy, about twelve miles north of Springfield, ten miles north of Decatur, and ten miles south of Champaign, Urbana, and Danville. Other, but smaller, cities lying near the same parallel are: Mount Sterling, Beardstown, Petersburg, Lincoln, Clinton, Monticello, and Georgetown. The fortieth parallel crosses ten counties: Adams, Brown, Schuyler, Cass, Menard, Logan, Macon, Piatt, Champaign, and Vermilion.

The latitude of Illinois is favorable to the development of a strong, vigorous, and progressive people. Its location, somewhat south of the middle line of the north temperate zone, insures a moderate climate in which farm crops and domestic animals thrive. Its climatic changes are sufficient to stimulate

healthful human activity and to encourage productiveness in the various occupations.

The Illinois-Indiana boundary line is in $87^{\circ} 31'$ W. long., but the easternmost boundary of the state lies in the middle of Lake Michigan in approximately $87^{\circ} 5'$ W. long. The westernmost bend of the Mississippi along Illinois is in $91^{\circ} 31'$ W. long., in Adams and Hancock counties. The extreme width of the state from Indiana to the Mississippi River is 4 degrees of longitude, or 216 miles.



RELIEF MAP OF THE UNITED STATES; ILLINOIS IN THE GREAT PLAIN

The position of Illinois in the Great Central Plain gives it a comparatively level surface, fertile soil, good drainage, and a favorable climate.

The meridian of 89° west longitude crosses the state almost centrally. The Third Principal Meridian, from which most of the state is surveyed, lies about eight miles west of the eighty-ninth meridian. The automobile route known as the Meridian Road extends across the state from north to south and closely parallels the eighty-ninth meridian and the Third Principal Meridian, from Beloit, Wisconsin, and Rockford, Illinois, on the north, to Cairo, Illinois, on the south.

The eighty-ninth meridian passes through or within ten miles of Rockford, La Salle, Peru, Ottawa, Streator, Bloomington, Decatur, Centralia, and Cairo. Other, but smaller, cities

lying near the same meridian are: Belvidere, Rochelle, Mendota, Springvalley, Minonk, Normal, Clinton, Vandalia, Salem, Mount Vernon, Benton, Herrin, Carterville, Johnston City, Marion, Vienna, and Mound City. The eighty-ninth meridian crosses sixteen counties: Winnebago, Ogle, Lee, La Salle, Woodford, McLean, Dewitt, Macon, Shelby, Fayette, Marion, Jefferson, Franklin, Williamson, Johnson, and Pulaski.

The location of Illinois with reference to longitude throws the state within the Great Central Plain of the United States with its fertile glacial soils, its abundant coal resources, and its continental climate, which gives cold winters, warm summers, and abundant rainfall.

Length of boundaries.—The following table gives approximate lengths of the various sections of Illinois boundaries:

BOUNDARIES	MILES LENGTH IN
Northern boundary	180
Mississippi River to shore of Lake Michigan : : :	150
Shore to middle of Lake Michigan	30
Eastern boundary	460
Along middle of Lake Michigan to Indiana state line : : :	50
Along northern boundary of Indiana	20
Northwest corner of Indiana to Wabash River : : :	190
Wabash River, including meanders	200
Southern boundary, Ohio River, including meanders	125
Western boundary, Mississippi River, including meanders	615
Total length of boundaries	1,380
Total land boundaries	(25 per cent) 340
Total water boundaries	(75 per cent) 1,040
Lake Michigan shore in Illinois	60

Area.—Illinois contains 56,665 square miles, divided between land and water as follows: land area, 56,043 square miles (99 per cent); water area, 622 square miles (1 per cent). These figures are from the United States Census. The water area is composed of the small lakes of the state and the larger rivers. It does not include that part of Lake Michigan within the state boundaries. County areas are always given in terms of land area.

Illinois ranks twenty-third in area among the states of the Union; 22 states are larger and 25 are smaller. The average

size of the 48 states is 62,000 square miles. Continental United States would make 53 states as large as Illinois. Although Illinois ranks twenty-third in area, it stands first among the states in total value of farms and of farm crops, second in mineral wealth, and third in population. These comparisons indicate that Illinois has exceptional natural advantages and that her people have been diligent in the development of the natural resources of the state.



MAP SHOWING ILLINOIS IN THE UNITED STATES IN FOUR PLACES

About one-third of the United States has the same latitude as Illinois. Illinois has an area of less than one-fourth that of Texas.

Texas is four and three-fourths times as large as Illinois. Illinois is forty-five times as large as Rhode Island. McLean, the largest county of Illinois, has an area about the size of the state of Rhode Island. The reach of Illinois in latitude, if placed on the coasts of the United States, is shown on the accompanying map.

Europe, at the outbreak of the Great War, held 26 independent countries in an area only one-fourth larger than Continental United States. Only one of these countries, Russia, is larger than Texas; 9 are larger and 17 are smaller than Illinois. Eight of the smaller European countries

could find room within the confines of Illinois with 201 square miles to spare, but their population is three and a half times that of Illinois. These relationships are graphically presented on the accompanying map.



EQUIVALENT AREAS OF THE SMALLER COUNTRIES OF EUROPE SHOWN ON MAP OF ILLINOIS

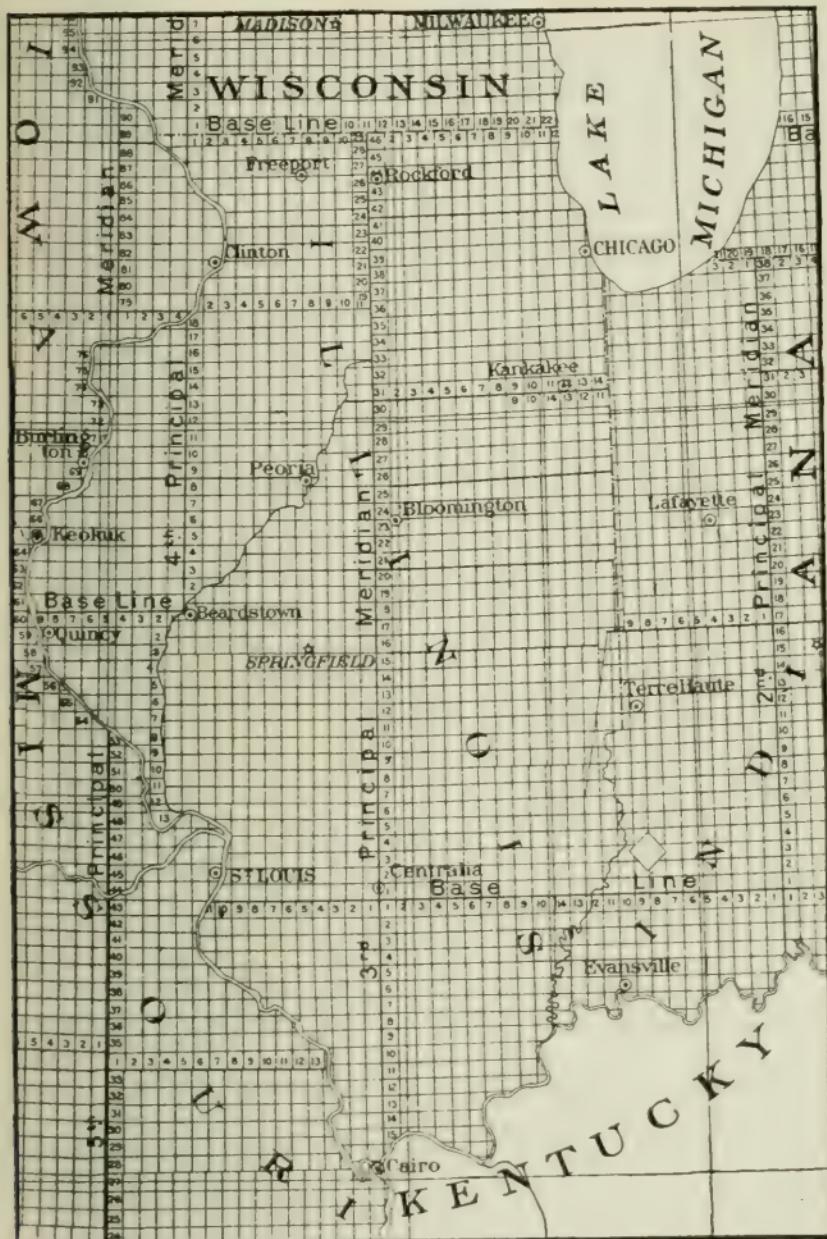
The smallest eight countries of Europe occupy a combined area slightly less than that of Illinois. Their combined population is $3\frac{1}{2}$ times that of Illinois.

the entire length of the state; the *third* is in the center of Illinois, extending the entire length of the state; the *fourth* is in western Illinois and Wisconsin, extending from Beardstown north to the Mississippi River near Rock Island, and from the Mississippi River near Galena northward through Wisconsin. Illinois is surveyed from the second, third, and fourth principal meridians; much the larger part of the state from the third.

Base lines extend east-west along geographic parallels. The second and third principal meridians have the same base line extending across southern Indiana and southern Illinois in

Land surveys.—It is necessary to have land surveyed so that small tracts may be located with absolute accuracy. In no other way can the landowner establish his right to his farm or the tax assessor and tax collector make proper record of their work.

The method of survey whereby Illinois lands are marked off was provided by Congress in 1785. The plan involves the establishment of "principal meridians" running north-south and "base lines" running east-west. The *first principal meridian* is the boundary line between Ohio and Indiana; the *second* is west of the center of Indiana, extending



BASE LINES AND PRINCIPAL MERIDIANS FOR ILLINOIS AND INDIANA

Each small square represents a congressional township 6 miles square or 36 square miles. Fractional townships result where surveys from different base lines or different principal meridians come together.

38° 27' N. lat. from the Ohio River to the Mississippi. The fourth principal meridian has two base lines, one extending westward from its southern extremity at Beardstown to the Mississippi River, and the other forming the Illinois-Wisconsin boundary line. Only the southern base line is used in the Illinois surveys.

6	5	4	3	2	1
7	8	9	10	11	12
18	17	* 16 | + |	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

CONGRESSIONAL TOWNSHIP WITH SECTIONS

The 36 sections of a township are indicated by numbers. Section 16 of the diagram is divided to show its quarter-sections and the quarters of a quarter-section.

From the principal meridian and the base line the region is laid off into townships six miles square, and the townships are numbered. The townships thus determined by survey are known as *congressional townships*. Each township is divided into thirty-six square miles, or sections, and numbered. Each section is divided into four equal squares, or quarter-sections. Tiers of townships are numbered north and south from the base line, and ranges of townships are numbered east and west from

the principal meridian. Thus, Township 16 North, Range 5 West of the Third Principal Meridian, is the township in which Springfield, the state capital, is located.

The thirty-six sections of a township are numbered in regular order beginning at the northeast corner and proceeding as indicated in the foregoing diagram. Portions of a section are designated by descriptive terms. Thus, the location of a 40-acre tract of land may be described as the SE. quarter of the NW. quarter of Section 16, Township 35 North, Range 10 East of the Third Principal Meridian. This area is found in Will County near Joliet.

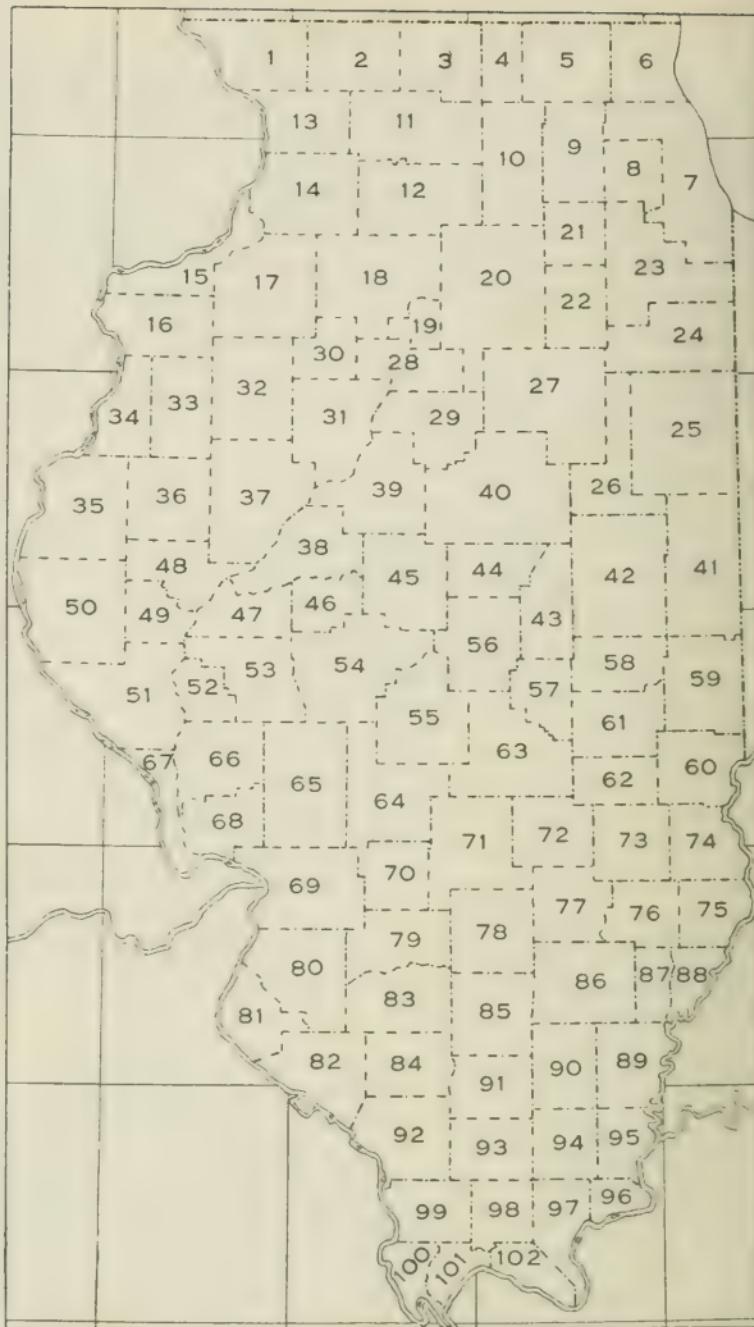
Surveys are made independently from each principal meridian. Where surveys from two principal meridians come together, there are many irregularities in a narrow strip extending north-south. These somewhat troublesome irregularities are found in eastern Illinois, where the surveys from the second and third principal meridians meet.

Thus the indefinite boundary lines of Indian hunting grounds gave way to the precise limits set by the white man's skilled surveyor. Only so could a sparsely populated hunting region become transformed in the course of many decades into a highly prosperous, well-populated agricultural land.

Counties.—The congressional townships are too small to serve as divisions of the state for purposes of local government. The state was at first divided into a few counties. As population increased, the large counties were subdivided by acts of the General Assembly until, in 1859, the present number, 102, were organized.

County lines may or may not follow the boundaries of congressional townships. For purposes of local government the county is divided into *civil townships*. The civil township is a governmental unit. It may or may not coincide with the congressional township. The civil township is *named*, while the congressional township is *numbered*. The boundaries of civil townships do not extend across county lines, while the boundaries of congressional townships are not governed by the boundary lines of state or county.

The map on page 12 shows the 102 counties of the state. The numbers are placed in a convenient geographical order to



MAP OF ILLINOIS WITH COUNTIES NUMBERED

The names of counties may be readily determined by reference to the table at the end of the chapter. A study of this map for ready identification of counties will prove profitable.

aid in learning the names of the counties and their proper location in the state. Table I gives the name and some important facts concerning each county. A study of the map and the table will add much to the pleasure of reading about Illinois whether in the remaining chapters of this book, in the numerous state publications, in Illinois history, or in the daily newspaper.

Illinois of today.—Illinois today has a population of at least 6,000,000. This is 150 times as many people as lived in Illinois when it was admitted to the Union in 1818. Its railway mileage of 12,000 miles is greater than that of any other state except Texas. Among the forty-eight states of the United States, Illinois, according to the census of 1910, ranked:

First in value of farm property; value of farm crops; production of corn and oats; and number of horses;

Second in value of mineral products and number of hogs;

Third in population; school attendance; number of foreign-born; rural population; amount of improved farm land; and value of manufactures;

Seventh in production of wheat and number of cattle;

Eighth in production of hay and forage;

Tenth in density of population and total number of farms;

Twenty-third in area.

Thus Illinois, though not among the largest states of the Union, has come to rank high in many lines of production. If her resources are properly used and carefully conserved, Illinois will continue to add to her population and productive power.

The general map of Illinois is placed in the back of the book so that it may be unfolded and used for reference as the text is being read. A thorough knowledge of the legend of the map will enable the reader to determine instantly the approximate elevation of any region and the approximate population of all the towns named on the map. The State Geological Survey, Urbana, Illinois, publishes a large base map of Illinois, scale 1 inch to 8 miles. It may be secured at small cost. It will be of exceeding value to the reader if kept for constant reference while reading the *Geography of Illinois*.

TABLE I
AREA, POPULATION, AND COUNTY SEATS OF ILLINOIS

Number on Map	County	Area in Sq. Miles	Population 1910	County Seat	Population 1910
1.....	Jo Daviess	623	22,657	Galena	4,835
2.....	Stephenson	559	36,821	Freeport	17,567
3.....	Winnebago	529	63,153	Rockford	45,401
4.....	Boone	293	15,481	Belvidere	7,253
5.....	McHenry	620	32,509	Woodstock	4,331
6.....	Lake	455	55,058	Waukegan	16,069
7.....	Cook	933	2,405,233	Chicago	2,185,283
8.....	Dupage	345	33,432	Wheaton	3,423
9.....	Kane	527	91,862	Geneva	2,451
10.....	DeKalb	638	33,457	Sycamore	3,926
11.....	Ogle	756	27,864	Oregon	2,180
12.....	Lee	742	27,750	Dixon	7,216
13.....	Carroll	453	18,035	Mount Carroll	1,759
14.....	Whiteside	679	34,507	Morrison	2,410
15.....	Rock Island	424	70,404	Rock Island	24,335
16.....	Mercer	540	19,723	Aledo	2,144
17.....	Henry	824	41,736	Cambridge	1,272
18.....	Bureau	881	43,975	Princeton	4,131
19.....	Putnam	173	7,561	Hennepin	451
20.....	La Salle	1,146	90,132	Ottawa	9,535
21.....	Kendall	324	10,777	Yorkville	431
22.....	Grundy	433	24,162	Morris	4,563
23.....	Will	844	84,371	Joliet	34,670
24.....	Kankakee	668	40,752	Kankakee	13,986
25.....	Iroquois	1,121	35,543	Watseka	2,476
26.....	Ford	500	17,096	Paxton	2,912
27.....	Livingston	1,043	40,465	Pontiac	6,090
28.....	Marshall	396	15,679	Lacon	1,495
29.....	Woodford	528	20,506	Eureka	1,525
30.....	Stark	290	10,098	Toulon	1,208
31.....	Peoria	636	100,255	Peoria	66,950
32.....	Knox	711	46,159	Galesburg	22,089
33.....	Warren	546	23,313	Monmouth	9,128
34.....	Henderson	376	9,724	Oquawka	907
35.....	Hancock	780	30,638	Carthage	2,373
36.....	McDonough	588	26,887	Macomb	5,774
37.....	Fulton	884	49,549	Lewiston	2,312
38.....	Mason	555	17,377	Havana	3,525
39.....	Tazewell	647	34,027	Pekin	9,897
40.....	McLean	1,191	68,008	Bloomington	25,768
41.....	Vermilion	921	77,996	Danville	27,871
42.....	Champaign	1,043	51,829	Urbana	8,245
43.....	Piatt	451	16,376	Monticello	1,981
44.....	Dewitt	415	18,906	Clinton	5,165
45.....	Logan	617	30,216	Lincoln	10,892
46.....	Menard	317	12,796	Petersburg	2,587
47.....	Cass	371	17,372	Virginia	1,501
48.....	Schuyler	432	14,852	Rushville	2,422
49.....	Brown	297	10,397	Mount Sterling	1,986
50.....	Adams	842	64,588	Quincy	36,587
51.....	Pike	786	28,622	Pittsfield	2,095
52.....	Scott	249	10,067	Winchester	1,639

TABLE I—Continued

Number on Map	County	Area in Sq. Miles	Population 1910	County Seat	Population 1910
53.....	Morgan	576	34,420	Jacksonville	15,326
54.....	Sangamon	876	91,024	Springfield	51,678
55.....	Christian	700	34,594	Taylorville	5,446
56.....	Macon	585	54,186	Decatur	31,140
57.....	Moultrie	338	14,630	Sullivan	2,621
58.....	Douglas	417	19,591	Tuscola	2,453
59.....	Edgar	621	27,336	Paris	7,664
60.....	Clark	493	23,517	Marshall	2,569
61.....	Coles	525	34,517	Charleston	5,884
62.....	Cumberland	353	14,281	Toledo	900
63.....	Shelby	772	31,693	Shelbyville	3,590
64.....	Montgomery	689	35,311	Hillsboro	3,424
65.....	Macoupin	860	50,685	Carlinville	3,616
66.....	Greene	515	22,363	Carrollton	2,323
67.....	Calhoun	256	8,610	Hardin	654
68.....	Jersey	367	13,954	Jerseyville	4,113
69.....	Madison	737	89,847	Edwardsville	5,014
70.....	Bond	388	17,075	Greenville	3,178
71.....	Fayette	729	28,075	Vandalia	2,974
72.....	Effingham	511	20,055	Effingham	3,898
73.....	Jasper	508	18,157	Newton	2,108
74.....	Crawford	453	26,281	Robinson	3,863
75.....	Lawrence	358	22,661	Lawrenceville	3,235
76.....	Richland	357	15,970	Olney	5,011
77.....	Clay	462	18,661	Louisville	670
78.....	Marion	569	35,094	Salem	2,669
79.....	Clinton	483	22,832	Carlyle	1,982
80.....	St. Clair	663	119,870	Belleville	21,122
81.....	Monroe	389	13,508	Waterloo	2,091
82.....	Randolph	587	29,120	Chester	2,747
83.....	Washington	561	18,759	Nashville	2,135
84.....	Perry	451	22,088	Pinckneyville	2,722
85.....	Jefferson	603	29,111	Mount Vernon	8,007
86.....	Wayne	733	25,697	Fairfield	2,479
87.....	Edwards	238	10,049	Albion	1,281
88.....	Wabash	220	14,913	Mount Carmel	6,934
89.....	White	507	23,052	Carmi	2,833
90.....	Hamilton	455	18,227	McLeansboro	1,796
91.....	Franklin	445	25,943	Benton	2,675
92.....	Jackson	588	35,143	Murphysboro	7,485
93.....	Williamson	449	45,098	Marion	7,093
94.....	Saline	399	30,204	Harrisburg	5,309
95.....	Gallatin	338	14,628	Shawneetown	1,863
96.....	Hardin	185	9,724	Elizabethtown	633
97.....	Pope	385	11,215	Golconda	1,088
98.....	Johnson	348	14,331	Vienna	1,124
99.....	Union	403	21,856	Jonesboro	1,169
100.....	Alexander	226	22,741	Cairo	14,548
101.....	Pulaski	190	15,650	Mound City	2,837
102.....	Massac	240	14,200	Metropolis	4,655
Total.....		56,043	5,638,591		

CHAPTER II

GEOLOGY

Illinois rocks valuable.—The succession of the geologic processes of the past are extremely significant in the formation of the natural resources now available for the use of the people of Illinois. Soil, which is formed from decayed rock, is the most valuable mineral resource of the world, and Illinois has been well favored by the kinds of rock which, when broken into fine particles, produce fertile and lasting soils. Soil, however, is not usually included among the mineral resources, as its importance and its widespread presence over the earth's surface require separate discussion. The mineral products of Illinois consist of those useful materials obtained from the solid rock beneath the covering of loose earth known as mantle rock, or from the mantle rock itself, if these products are used for purposes other than the growing of crops. Among the mineral resources of Illinois are coal, petroleum, lead, zinc, fluor spar, and building stone which come from the solid rock, or bedrock; clay, sand, and gravel which come from the mantle rock; and road-building materials which are secured from both solid rock and mantle rock.

The annual output of Illinois minerals ranks next in importance to farm crops among the products of the state. In 1910 the value of the farm crops of Illinois was \$370,000,000, and the mineral output was valued at \$125,000,000. Because of increased production in some lines, and greatly increased prices for nearly all products, the value of the farm crops of 1917 was estimated at \$750,000,000, and the mineral output was valued at \$238,000,000. Illinois is surpassed only by Pennsylvania in the value of mineral production.

Studies in Illinois geology.—The Illinois State Geological Survey is organized as a part of the state government. Trained geologists, in the employ of the state, make extensive investigations and report concerning the rocks of the state and their use. The Geological Survey, through many years of research, has

learned the story of the geologic processes which have gone on throughout the ages in Illinois. These studies reveal where in the state the mineral resources are of sufficient value to offer profitable development. Experimental work carried on by the state discovers better methods of obtaining and using the mineral resources. This information is made freely available to all. Geology thus serves the practical needs of man, and its wide and systematic study can best be carried on by the state and national governments.

Kinds of rocks.—Nearly all the rocks of Illinois are sedimentary, that is, they were formed in the sea, which for many ages covered Illinois. Sediments washed into the sea from surrounding lands were deposited in the water, and, when solidified, formed sedimentary rocks. These sedimentary rocks of the state are so thick that the deepest well-borings, in many instances more than a thousand feet in depth, have not penetrated to the bottom of the sedimentary rocks.

Igneous rocks have been found in Illinois only at a few places where lava has been thrust as dikes into the fissures of the sedimentary rocks. Dikes are common in Pope and Hardin counties.

Metamorphic rocks are practically unknown in Illinois, although, in a coal mine in Saline County, a case of metamorphism has been found where coal has been changed to coke by geologic processes.

All sedimentary rocks rest upon igneous or metamorphic rocks. Therefore, at great depths, the whole of Illinois is underlain by rocks of other kinds than sedimentary, probably igneous rocks.

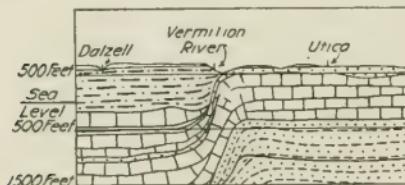
Divisions of geologic time.—Nearly all known rocks of Illinois belong to the Paleozoic era. *Eras* are divided into *periods* of geologic time. The rocks formed during an *era* make a *group* of rocks, those formed during a *period* make a *system*. The Paleozoic era which is so important in Illinois geology is divided into seven periods: Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, Permian.

The Cambrian *system* of rocks is at the base of the Paleozoic *group* of rocks in Illinois. Cambrian rocks are not found at the surface in the state, but they have been entered by

numerous deep wells, none of which has penetrated through the system.

Small areas of southern Illinois contain rock materials formed in the Mesozoic era, a later era than the Paleozoic, and all the extensive glacial deposits of the state were formed during the Cenozoic era, which is later than Mesozoic and includes the present.

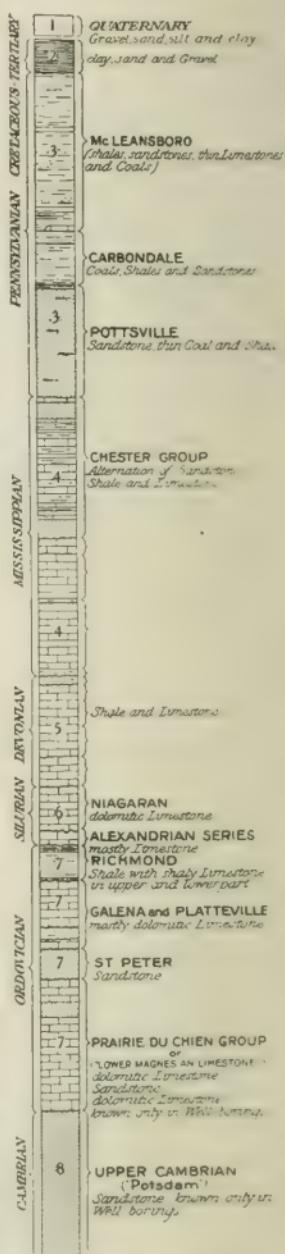
Folds and faults.—The rock layers in Illinois approach the horizontal in general position, but at places they form definite folds, show slight dips from the horizontal, or present faults of considerable magnitude. The best-known



LA SALLE ANTICLINE AT UTICA, LA SALLE COUNTY

This diagram shows the unsymmetrical form of the anticline at Utica. The dip on one side is almost imperceptible and on the other very steep.

rock fold in Illinois is the La Salle anticline which enters the state from Wisconsin into Stephenson County and extends in a southeasterly direction across the state. It crosses Rock River at Grand Detour in Lee County, and the Illinois River at Split Rock between La Salle and Utica. Farther south the La Salle anticline disappears at the surface, but it seems to continue as an underground structure, and in the main oil fields of southeastern Illinois it forms the rock structure necessary for accu-



COLUMNAR SECTION FROM
GEOLOGIC MAP OF
ILLINOIS, 1917



**GEOLOGIC MAP
OF
ILLINOIS**

A scale bar labeled "Scale" at the top center. It features a horizontal line with tick marks at 0, 10, and 100 Kilometers. Below the line, there are two sets of numbers: "37°" and "91°" on the left, and "90°" on the right.

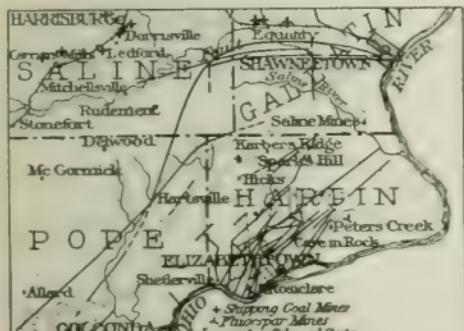
GEOLOGIC MAP OF ILLINOIS

For numbers explaining coloring, see columnar section on opposite page

mulations of oil, at a depth of several hundred feet below the surface.

The eastern interior coal field, occupying about three-fifths of Illinois and portions of Indiana and Kentucky, is a broad, shallow, synclinal fold dipping imperceptibly from all sides toward the center.

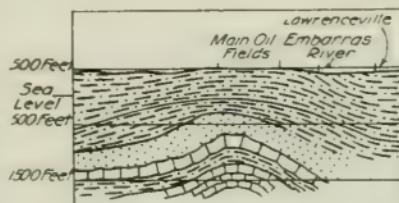
Faults, formed by the breaking and slipping of rock layers, are found in western and southern parts of the state. A fault crosses the Mississippi and Illinois rivers in Calhoun and Jersey counties. The slipping of the rocks along this fault amounts to a vertical displacement of 720 feet. Some faults occur in Pope County, and they are extremely numerous in Hardin County where the fluor-spar mines are closely associated with the faults. Other folds and faults than those mentioned are found in the state.



MAP OF HARDIN AND POPE COUNTIES SHOWING FAULTS

The rich fluor-spar mines of Hardin County are in the region of most numerous faults.

from this thick layer of sand is known as the Potsdam sandstone. It underlies the entire state. It is not found at the surface in Illinois, but outcrops in Wisconsin. It forms a reservoir for water, and the deep wells of the northern part of the state which penetrate it have an abundant supply of water.



LA SALLE ANTICLINE AT LAWRENCEVILLE, LAWRENCE COUNTY

Here the anticline is far below the surface of the earth, and its form is favorable for the accumulation of oil beneath.

Cambrian rocks.— During the Cambrian period, the sea covered Illinois, and great quantities of sand were washed from the surrounding lands into the sea. The rock formed

as the Potsdam sandstone. It underlies the entire state. It is not found at the surface in Illinois, but outcrops in Wisconsin. It forms a reservoir for water, and the deep wells of the northern part of the state which penetrate it have an abundant supply of water.

Ordovician rocks.—During the early part of the Ordovician period, the seas which covered Illinois furnished conditions favorable for the growth of animals having shells of lime. The shells were so abundant that they formed thick beds of limestone known as the Prairie du Chien group or the "Lower



DEER PARK CANYON, DEER PARK, LA SALLE COUNTY

In this scene we are looking down Deer Park Canyon from a point above the falls. This canyon, like the numerous smaller canyons of Starved Rock State Park, is cut in the St. Peter sandstone which forms the surface rock in this part of the Illinois Valley. Deer Park Canyon leads into the valley of Vermilion River a few miles from its junction with the Illinois River at La Salle. (Copyright by Keystone View Company.)

Magnesian limestone." These are the oldest rocks exposed in Illinois. They are brought to the surface along the La Salle anticline in the vicinity of Rock and Illinois rivers. These rocks have long been used at Utica, La Salle County, for making cement.

After the deposition of the Prairie du Chien group of rocks, the Illinois region was uplifted and became dry land. Later, the sea again occupied the region, and great quantities of sand, washed in from surrounding lands, formed the St. Peter sandstone. St. Peter sandstone forms the bluffs of the Illinois and Fox rivers in La Salle and Kendall counties, the bluffs of Rock River in Lee and Ogle counties, and it is found on the north side of the fault line in Calhoun County. It furnishes sand for glass-making, molding, and building. The Federal Plate Glass Works at Ottawa are located on St. Peter sandstone which may be used as the chief raw material for the factory. The St. Peter sandstone is a great reservoir of water for artesian wells.

After the St. Peter sands were deposited, conditions became favorable again for the growth of shell-forming animals. The Galena and Platteville limestones, formed at this time, are the surface rocks of north-central and northwestern Illinois, extending into Wisconsin. Veins of lead and zinc ores occur in these rocks in Jo Daviess and Stephenson counties in Illinois, and in southwestern Wisconsin. The lead and zinc mines of this formation were of great importance prior to the opening of richer deposits in the Joplin, Missouri, district.

Silurian rocks.—During the Silurian period the sea of the Illinois region was an arm of the Gulf of Mexico, which shifted back and forth across the state. The most extensive outcrops of Silurian rocks are two broad belts in the eastern and western parts of northern Illinois separated by a broad area of Ordovician rocks in the north-central part of the state. The Niagara limestone is the principal rock formation of the Silurian system in Illinois. The Chicago Drainage Canal



LIMESTONE QUARRY, THORNTON, COOK COUNTY

Limestone quarries are common in areas where the glacial drift is thin enough to be readily removed. Crushed limestone is used for road metal, fertilizer, or the making of lime.

which extends from Chicago to Lockport, a distance of 28 miles, is cut in the Niagara limestone in much of its lower course. The traveler on the railroad running parallel with the canal may see a long ridge of rock fragments which have been excavated from the canal. The Niagara formation furnishes



FRENCH CANYON, STARVED ROCK STATE PARK

This canyon, one of the most picturesque of the park, is easy of access from the park entrance, and is visited by more persons each year than any other canyon. Forms of vegetation not found elsewhere in Illinois are found on the cliffs and in the recesses of the canyons of Starved Rock State Park. (Copyright by Keystone View Company.)

limestone for building, furnace flux, concrete, and road-making. Many quarries are found in Chicago and in the vicinity of Joliet.

Devonian rocks.—During much of the Devonian period, the Illinois region was largely dry land. The chief regions of Devonian rocks are in detached areas in several counties along

the Mississippi River, including Rock Island, Calhoun, Jersey, Jackson, Union, and Alexander counties.

Mississippian rocks.—The Mississippian rocks are exposed in Illinois in a very long and relatively narrow belt extending from Mercer County southward along the Mississippi Valley to the Ozarks, then eastward to the Ohio River along the crest of the Ozark Ridge of Illinois. These rocks include sandstones, shales, and limestones. They furnish materials for building, lime, concrete, riprap, and Portland cement. A large Portland-cement plant has been recently erected at Golconda, Pope County, where raw materials are furnished in abundance from the high bluffs of Mississippian rocks overlooking the Ohio River. Veins of fluor spar, lead, and zinc occur in Mississippian rocks of Hardin and Pope counties.

Pennsylvanian rocks.—The soil alone is the only resource of greater value to Illinois than the 240,000,000,000 tons of coal locked in the Pennsylvanian rocks or "Coal Measures" of the state. This is a larger coal reserve than that held by any other state east of the Mississippi River. In addition to the coal, this system of rocks is rich in petroleum, building stone, and materials for Portland cement, building and paving brick, sewer pipe, pottery, and tile.

Pennsylvanian rocks consist of sandstones, limestones, shales, and thick layers of coal. They form the surface rocks of about three-fifths of the state, lying south of a line drawn from Rock Island to Joliet. After the close of the Pennsylvanian period, only the extreme southern counties were ever again beneath the sea.

The State Geological Survey has recognized sixteen different coal seams, varying in thickness from one to nineteen



DRAINAGE CANAL AT ROMEO, WILL COUNTY

In this part of its course the Drainage Canal is cut through solid rock. In rock the canal is narrower than in earth and the sides are vertical while in the wider earth channels the sides are gently sloping. (Photograph by W. D. Jones.)

feet, separated by layers of shale, sandstone, and limestone. The total thickness of the rocks of the Pennsylvanian system in Illinois is not less than 1,200 feet. Only a small fraction of the entire mass of the system consists of coal.

The Permian period.—The Permian period in the United States was accompanied by great land movements. The Appalachian Mountains to the east and the Ozark Plateau to the west were uplifted. The La Salle anticline in Illinois was further elevated, and the Ozark Ridge of southern Illinois, extending eastward from Union County to the Ohio River, was raised as a spur to the Ozark Dome of Missouri.

Molten rock moved upward through fissures in Pope, Hardin, and adjoining counties, and, if it did not overflow, it reached an elevation so high that subsequent erosion has exposed it in dikes. The numerous faults and small folds of southern Illinois were probably formed at this time. Beneath some of these low arches and domes, in the porous strata that are overlain by dense, impervious layers, the oil and gas deposits of Illinois have accumulated. While these folds were made during Permian time, the rocks that were folded belong to an earlier period, Pennsylvanian or Mississippian.

Cretaceous and Tertiary time.—The Illinois region has been dry land since the close of the Pennsylvanian period. During the Cretaceous period, in the latter part of the Mesozoic era, and during Tertiary time, in the early part of the Cenozoic era, a narrow strip of southern Illinois along the Ohio River in Pulaski, Massac, and Pope counties was submerged and received sediments of clay, sand, and gravel.

The Glacial period.—The latest event that greatly changed the surface of Illinois was the slow movement of enormous ice sheets over portions of the state at different times during the Glacial period, the last period of the Cenozoic era. The glacial drift covers the solid rock with a thick layer of mantle rock. The work of glaciation is discussed in some detail in the next chapter.

The geology of Illinois is strikingly presented in the Geologic Map of Illinois, published by the State Geological Survey, Urbana, Illinois.

CHAPTER III

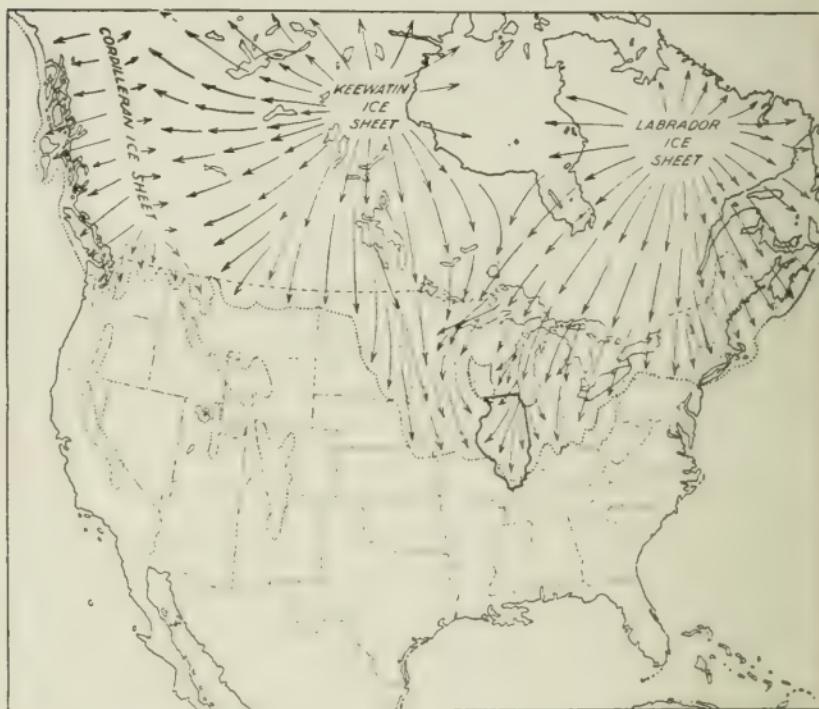
THE GLACIAL PERIOD

Preglacial Illinois.—During the long ages from the close of the Pennsylvanian period of the Paleozoic era to the opening of the Glacial period in the late Cenozoic era, Illinois was exposed to the constant activities of the ordinary processes of erosion in operation today. The surface rocks of the Pennsylvanian and earlier periods were weathered into fragments. Then, as now, a network of streams carried the rock waste along their courses across the state. Master-streams like the Mississippi, Ohio, Illinois, and Wabash received the débris and carried it on to the sea. Valleys were deeply carved, and they were widened to the stage of maturity. Much of the state possessed a rugged, mature topography similar to that now found in the Driftless Area of northwestern Illinois and southwestern Wisconsin. The smaller stream systems were wholly different in their details from those of today; even the vigorous Mississippi occupied, at places, a very different course from the one along which it now flows.

A mantle of soil, weathered from the underlying rocks, overspread the state; plants appropriate to the soil and the climate had become established; and animal life, adapted to the environment of the time, wandered over the region. We cannot know the exact conditions of the state in preglacial time, but by comparison with the adjoining unglaciated districts we know that the topography, developed by long-continued stream erosion, was more rugged than now, the soil thinner and not so fertile, and the conditions for the development of plant and animal life, especially with reference to human needs, not so favorable as at present.

The Glacial period.—Glaciation has been an important factor in shaping the present relief of Illinois. A change of climate produced conditions over Northern North America and Northwestern Europe such that more snow fell during the winters than could be melted during the succeeding summers.

These accumulations of snow resulted, after centuries of time, in great snow fields, which, under their own weight, became slowly moving continental glaciers. The North American ice sheet, with centers of accumulation in Labrador, in Keewatin in Central Canada, and in the Canadian Cordillera, covered nearly all of Canada and much of Northern United States. It reached its farthest extension southward in Illinois,



CONTINENTAL GLACIATION IN NORTH AMERICA AS RELATED TO ILLINOIS

The North American ice sheet extended farther south in Illinois than elsewhere. The Driftless Area was most extensive in southwestern Wisconsin, as shown on the map. It occupies small areas also in Illinois, Iowa, and Minnesota.

where its southern edge rested on the northern flank of the Ozark Ridge in Jackson, Williamson, Saline, and Gallatin counties, 1,600 miles from the center of accumulation in the peninsula of Labrador.

During the Glacial period the ice sheet advanced into the United States five times. At least three of these invasions—

the Illinoian, Iowan, and Wisconsin—reached far into Illinois, and each produced profound changes in the surface and the soils of the state. Extensive studies have been made by glacial geologists to determine the duration of the Glacial period. The estimates place the beginning of the period at more than 300,000 years, possibly as much as 1,000,000 years ago; the climax of the Illinoian invasion at more than 140,000 years; the Iowan at more than 60,000 years; and the Wisconsin at more than 20,000 years ago. The Glacial period is only a small fraction of the total of geologic time.

Evidences of glaciation.—It is fully demonstrated that at least nine-tenths of Illinois has been glaciated. The character of the mantle rock, the glacial "drift" or "till," and the appearance of the surface of the bedrock of the glaciated regions can be explained only by glacial action. The glacial drift varies in thickness from a thin veneer to more than 300 feet; its depth for the entire glaciated region averages about 75 feet. This drift is made up of materials varying from fine particles of clay to large boulders, the whole so thoroughly mixed together that the result could be accomplished only by glacial action. Among the drift are numerous pebbles and boulders, subangular in form and strongly striated in the manner characteristic of glacial action.

Ridges of unassorted drift are found in many places in Illinois, in some cases forming long, broad, continuous ridges extending for hundreds of miles across Illinois and adjoining states. These are the "terminal moraines" of the North American ice sheet. The Shelbyville, Bloomington, and Valparaiso moraines are the most conspicuous ridges of this character in Illinois. Each is named from a city located on its



GLACIAL DRIFT IN VALPARAISO MORaine

Glacial drift, as in this scene, may consist of materials of various sizes from large boulders to fine clay, heterogeneously mixed together. (Photograph by W. D. Jones.)

crest. No agent except glaciers is known to produce such ridges as these moraines.

Numerous boulders in the drift, and the "boulder belts" or "boulder trains" many miles in length in Kankakee, Will,

Grundy, Kendall, and Cook counties, tell that these great rocks have been plucked from the granite areas of the Lake Superior region and carried for more than 500 miles from the rock formations of which they were once a part.

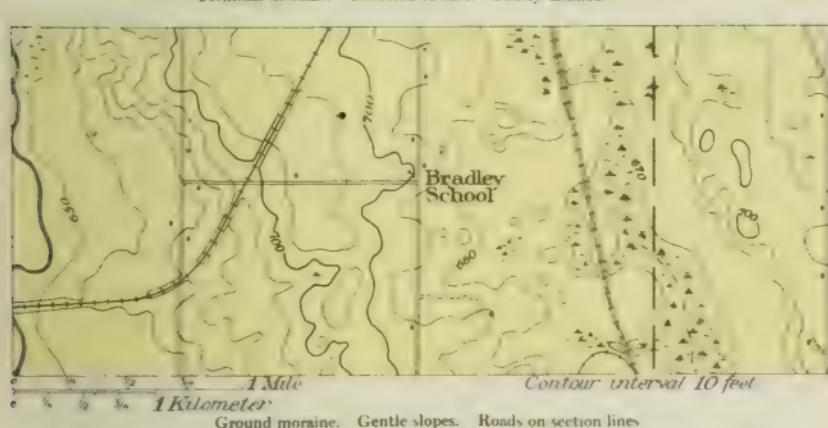
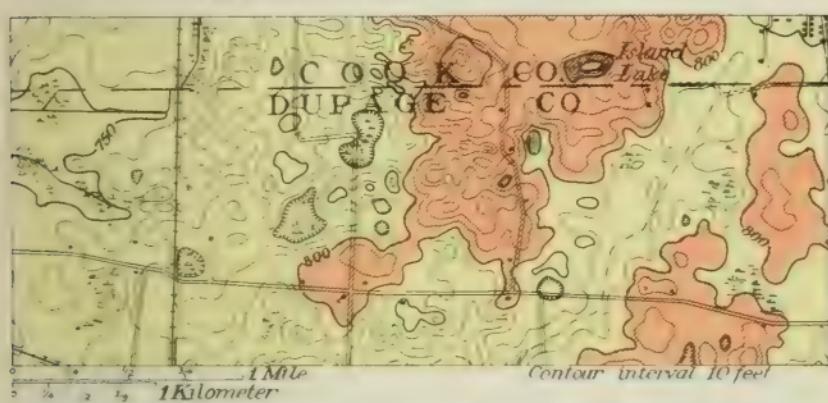
The thickness of the mantle rock of the glaciated region is much greater on the average than that of the unglaciated districts. The bedrock beneath the drift is smoothed and polished by the grinding power of glacial action, while the mantle rock of the unglaciated areas grades gradually and with increasing coarseness of form into the bedrock beneath. The bedrock exposed at Stony Island in South Chicago shows numerous "chatter marks" characteristic of glacial



MORAINAL SYSTEM OF WISCONSIN GLACIATION
IN ILLINOIS

The terminal moraines of the Wisconsin glaciation are usually the most conspicuous irregularities found in the topography of northeastern Illinois. The line of separation between the terminal moraine and the more level ground moraine is often sharp and well defined. Elsewhere the terminal moraine may fade imperceptibly into the ground moraine.

action. At the Hawthorne Stone Quarry, just west of Chicago, the mantle rock has been removed for quarrying purposes, and the exposed surface of the bedrock is shown smoothed, striated, and polished, exhibiting the work of powerful tools in the grip



TOPOGRAPHIC MAPS OF DRIFTLESS AREA, TERMINAL MORAINES, GROUND MORAINES

The most rugged land of the state is in the unglaciated areas. The terminal moraines consist of ridges, having a relief up to 200 feet or more. The ground moraines, more extensive in area than the terminal moraines, are the more level lands of the state.

of the massive ice sheet. The St. Peter sandstone at the Federal Plate Glass Factory at Ottawa presents a rock surface deeply grooved by glacial action.

Kames, short ridges of sand and gravel formed near the edge of the ice, are found in the Kaskaskia Basin and elsewhere among the terminal moraines of the state. **Eskers**, ridges of sand and gravel accumulated by the wash of streams in tunnels under the ice, are well developed in the pre-Iowan drift of Ogle and Stephenson counties.

Outwash plains, belts of débris deposited along the outer margin of the larger terminal moraines, and **valley trains**, long lines of débris deposited in valleys leading from terminal moraines, are numerous and well developed especially in the Wisconsin glaciation of the state.

Unglaciated areas.—Three regions of limited area within Illinois were untouched by the ice sheet. The largest of these includes the seven southernmost counties of the state and the southern edge of the next four counties. The ice sheet pushed southward to the Ozark Ridge and up its northern slope, depositing drift 20 to 25 feet thick, but the ice did not override the crest of the ridge. This is the most southern latitude reached by the North American ice sheet. A second unglaciated region within the state lies between the Mississippi and Illinois rivers in Calhoun and Pike counties. The Kansan ice sheet approached this region from the west and the Illinoian ice sheet from the east, but neither crossed the narrow rugged area.

The third unglaciated area of Illinois occupies nearly all of Jo Daviess County and small portions of Stephenson and Carroll counties. It is only a part of a much larger unglaciated district known as the "Driftless Area" which occupies portions of the four states, Illinois, Wisconsin, Minnesota, and Iowa. The Driftless Area includes 8,000 to 10,000 square miles, about 600 square miles of which is in Illinois.

This unglaciated region is entirely surrounded by thick deposits of glacial drift. Why it escaped glaciation is not well understood. The value per acre of its farm lands is very much less than that of the adjoining glaciated regions. The three unglaciated districts of Illinois have a total area of approximately 4,000 square miles.

For the unglaciated areas of the state see the soil map facing page 152, the red areas marked No. 1, in Joe Daviess, Calhoun, and the southernmost group of counties.

Early ice invasions.—The oldest drift sheet, the sub-Aftonian of the first ice invasion, did not, so far as known, reach Illinois. It lies buried beneath the later drift in Iowa, where it has been exposed by erosion. The Kansan, or second ice invasion, produced a drift sheet which lies at the surface over a large area in Kansas, Missouri, Iowa, and Nebraska. The Kansan glacial lobe, which radiated from the Keewatin center of glaciation, seems to have crossed into Illinois, and it probably forced the Mississippi River, for the time being, into a channel farther east than its present course. Any Kansan drift laid down in Illinois has been deeply covered by the deposits of later invasions, and it is not found at the surface within the state.

Illinoisan glaciation.—The third ice invasion radiated from the Labrador center of the North American ice sheet and overspread so much of Illinois that the glacial lobe and the glacial drift of this ice advance is known as the Illinoisan. The movement of the Illinois glacial lobe was southwestward. The ice at this stage reached a lower latitude, $37^{\circ} 40'$, than elsewhere in North America, and a point 1,600 miles from the center of accumulation, a distance somewhat greater than the movement of any other ice invasion from its center.

The ice sheet of the Illinoisan glaciation crossed the Mississippi River between Rock Island, Illinois, and Fort Madison, Iowa, and forced the Mississippi about twenty miles farther west than its present course. The Mississippi River thus suffered important changes of position in portions of its course by both the Kansan and the Illinoisan glacial invasions. The Mississippi channel which had been established by the Kansan lobe was completely obliterated and deeply covered by the drift of the Illinoisan glaciation.

The Illinoisan drift sheet extends northeastward under the later glacial deposits far back from the southern margin. The surface exposures of the Illinoisan glaciation forms a great crescent-shaped area extending southward beyond the more recent drift sheets through Wisconsin, Illinois, Indiana, and

Ohio. This drift area is widest and best developed in western and southern Illinois, hence the name.

Terminal moraines were formed in the Illinoian glaciation as ridges or mounds which now form low but conspicuous irregularities in the landscape. One group of these morainal elevations is readily traced on the soil map from Jackson County northward and northeastward along the Kaskaskia River, thence northwestward to Logan and Mason counties. Another group is found extending from Pike County northward along the Mississippi and Illinois rivers. On the map No. 2 stands for the terminal moraines of the Illinoian glaciation.

Divisions of the Illinoian glaciation.—An examination of the map shows that the Illinoian drift sheet is divided into three parts: the Lower Illinoian glaciation (No. 3), mainly between the Wabash and Kaskaskia rivers; the Middle Illinoian glaciation (No. 4), between the Kaskaskia and Illinois rivers; and the Upper Illinoian glaciation (No. 5), between the Illinois and Mississippi rivers. This division is based on differences in the agricultural values and in the properties of the soils in these regions.

The pre-Iowan glaciation, No. 6 of the map, in the northwestern part of the state is sometimes classified with the Illinoian, but it may be a drift sheet intermediate between the Illinoian and Iowan glaciations.

Iowan glaciation.—In the Rock River Basin of northern Illinois is a portion of a drift sheet known as Iowan. It is represented by No. 7 on the map.

The loess.—Loess is a variety of silt, intermediate in the size of its particles, between clay and sand. The loess of Illinois is associated with the Iowan stage of glaciation. The loess covers the areas of Illinoian drift, and it is covered by the Wisconsin drift. It seems to be a wind-blown product, and has a very wide distribution in the state. Over the uplands it commonly has a depth of 3 to 10 feet. Along the valleys, especially the Mississippi, Illinois, and Wabash, the deposits of loess are much thicker, a depth of 30 to 40 feet being common, with a maximum of nearly 100 feet. These are known as *deep loess* areas, and are represented on the map by No. 8.

Wisconsin glaciation.—The fifth and last ice invasion of the United States covered the northeast quarter of Illinois, extending southward as far as Clark and Cumberland counties. The Early Wisconsin glaciation is represented by Nos. 9 and 11 of the map and the Late Wisconsin glaciation by Nos. 10 and 12. Wherever the Wisconsin drift sheet is found in the state, it lies at the surface, covering the older drift sheets of northeastern Illinois. The Wisconsin drift covers a large area in Wisconsin and swings in a broad curve across northwestern Indiana and far into Michigan.

While the terminal moraines of the Illinoian drift are of very moderate elevation and length, and those of the Iowan but slightly developed, the moraines of the Wisconsin are among the largest and longest of the world. There are three conspicuous and very extensive moraines of the Wisconsin drift.

1. The Shelbyville moraine marks the outer edge of the Wisconsin drift, and extends from Indiana across Illinois to Peoria County.

2. The Bloomington moraine consists at places of a single ridge, at other places of a group of ridges extending from Indiana across Illinois to Peoria County, where it overlaps the Shelbyville moraine and continues at the outer margin of the Early Wisconsin glaciation to Kane County, where it, in turn, is overlapped by the Late Wisconsin.

3. The Valparaiso moraine belongs to the Late Wisconsin glaciation. It is a broad belt of massive ridges extending from Grand River in Michigan across northwestern Indiana, northeastern Illinois, and along eastern Wisconsin to Green Bay.

Other minor moraines are conspicuous features of the landscape, and a number have been named from cities located on them. Thus we have: (1) the Champaign moraine with its offshoot, the Cerro Gordo moraine; (2) the Chatsworth ridge and the Cropsey ridge branching from the Bloomington moraine; (3) the Marseilles moraine crossing the Illinois River at Marseilles; (4) the Minooka ridge extending from the Valparaiso moraine along the county line of Kendall and Will counties.

On the map, all moraines of the Early Wisconsin are represented by No. 9 and those of the Late Wisconsin by No. 10.

While the terminal moraines of the Wisconsin drift stand out conspicuously in the landscape, the larger area of the Wisconsin glaciation belongs to the level "ground moraines" occupying the broad stretches between the ridges of the terminal moraines. They form extensive areas of fertile farm land of sufficient slope to be easily drained, and sufficiently level to reduce loss of fertility by erosion to a minimum and to make the operation of modern farm machinery easy and highly profitable. The ground moraines of the Early Wisconsin, No. 11 on the map, are much more extensive in Illinois than those of the Late Wisconsin (No. 12).

Sand, swamp, and bottom lands.—During and after the retreat of the ice sheets from Illinois, great streams of water flowed across the state, the water supply coming from the rainfall and from the melting glacier. While the massive ice sheet blocked the outlets to the east and northeast, glacial lakes formed along the front of the ice barrier, the ice forming their northern shores and the terminal moraines their southern margins. Large areas of northeastern Illinois in the Wisconsin glaciation were thus regions of shallow lakes. Much of the land of this region today consists of the basins of these lakes drained by the withdrawal of the glacial barrier, or by down-cutting of their outlets, or by great open ditches constructed by man.

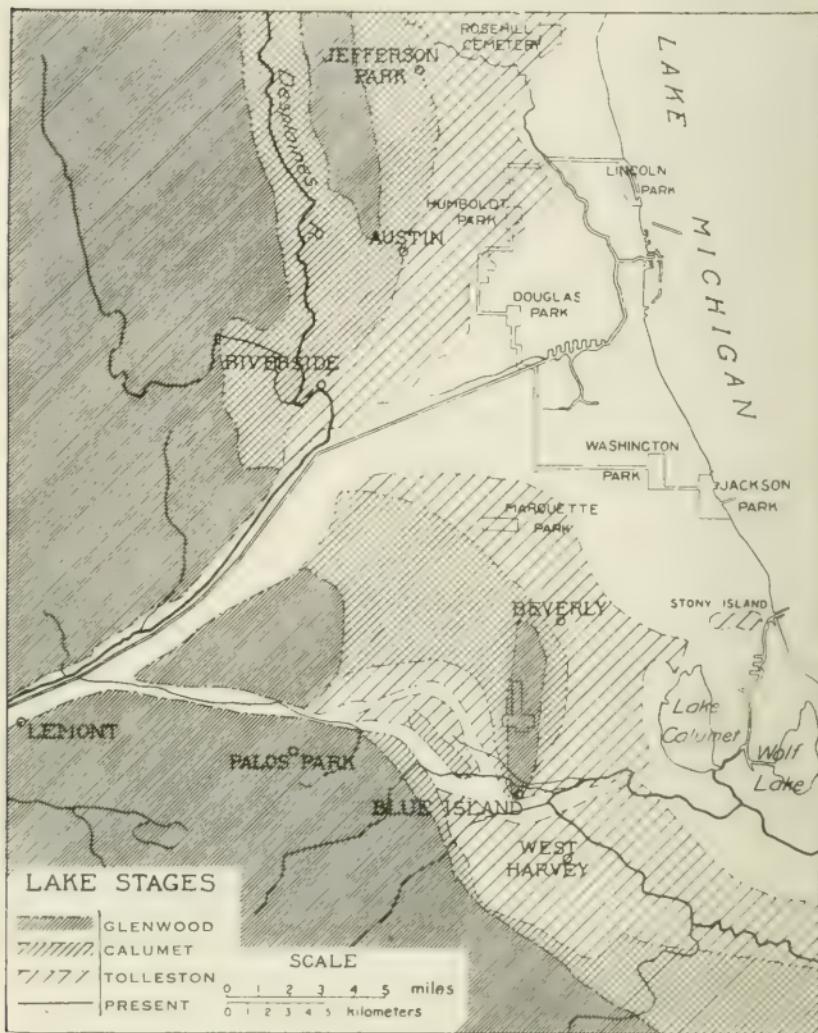
The most noted of these glacial lakes in Illinois is known as Lake Chicago, the ancestor of Lake Michigan. As the glacial barrier prevented the flow of water along its present



SOUTH OVER DES PLAINES OUTLET

This broad valley, now occupied by a small stream, was once filled with the overflow from the ancient Lake Chicago. (Photograph by W. D. Jones.)

outlet, the waters of Lake Chicago, bordered by the ice on the north and by the massive Valparaiso moraine on the south,



LAKE STAGES

The ancient Lake Chicago stood highest at the Glenwood stage, at which time the site of the city of Chicago and vicinity was lake bottom. The Calumet stage and the Tolleston stage represent successively lower levels of Lake Chicago, while a further recession of waters established the shore line of the present Lake Michigan.

rose until they found an outlet across the Valparaiso moraine along the present drainage line of the Des Plaines River. The

broad, deep valley, eroded by the escaping waters of Lake Chicago, is known as the "Chicago Outlet." The valley bluffs of the Chicago Outlet are conspicuous and interesting features of the landscape to the traveler between Chicago and Joliet. The Chicago Outlet furnished easy portage to Joliet and Marquette in 1673, and later to La Salle and other explorers. It became the route, successively, of the Illinois and Michigan Canal; the Santa Fe and the Chicago and Alton railroads; the Chicago Drainage Canal; and the Chicago and Joliet electric railroad.

The "Chicago Plain," the bottom of Lake Chicago which has been made dry land by the withdrawal of glacial waters, covers much of Cook County and extends into Indiana.

Sediment in great quantities was carried by the streams flowing across Illinois from the retreating Wisconsin glacial lobe. This sediment was deposited in the shallow glacial lakes and on the flood plains of the streams. The valleys were so well filled by the excessive water supply, and the sediment was so abundant, that the bottom lands developed along these streams during earlier stages of glaciation were widely and deeply covered by the sediments of the drainage waters of the Wisconsin stage. Where sand was abundant, the winds carried it beyond the immediate limits of the valley, thus forming considerable areas of sand deposits especially in Mason, Tazewell, and other river counties. These sand areas are mainly east of the Illinois River, due to the strength of the prevailing westerly winds.

A study of the map reveals the relation of the old bottom lands and the late bottom lands to each other, to the stream valleys, and to the shallow glacial lakes. No. 13 represents the "old river bottom and swamp areas." It is found outside the Wisconsin glaciation along the streams in the Illinoian glaciation, often separated from the stream by No. 14 representing "sand, late swamp, and bottom lands." Before the Wisconsin stage, these flood plains were wholly occupied by No. 13, the "old river bottom and swamp areas." The flood of waters from the Wisconsin glacier with its load of sediment very largely buried these "old river bottom and swamp areas" beneath the materials represented by No. 14 as the "sand, late

swamp, and bottom lands." Interesting relationships between these old and late river bottoms appear from a study of the map along the Illinois River, along the Mississippi and its tributaries in southern Illinois, and especially along the Wabash and its Illinois tributaries, the Embarras, Little Wabash and its Skillet Fork, and along the Saline River and its tributaries.

Results of glaciation.—No event of geologic history means as much to Illinois as the activities of the North American ice sheet. The fertile soils formed during the Glacial period are of greater value to the citizens of Illinois than the great

wealth of the coal deposits of the Pennsylvanian period. Illinois was so fortunately situated that the rock material entering into her glacial soils was such as to furnish necessary plant food in abundance, thus producing a soil which, with scientific treatment, will maintain its fertility through an indefinite future. In the glacial drift are found deposits of sand, gravel, and clay, valuable for building purposes, for drainage



CLAY PIT IN SIDE OF BLUE ISLAND,
COOK COUNTY

Clay deposits, suitable for brick and tile, are widely distributed through the glacial drift of Illinois. Clay for pottery is found in more limited areas. (Photograph by W. D. Jones.)

tile, pottery, and road-making materials. The level surface of the glaciated regions of the state have invited railroad building which gives all parts of Illinois splendid transportation facilities. Although Illinois stands twenty-third in area, the fact that she stands first in value of farm lands and farm crops, second in railroad mileage and wealth, and third in population and manufactures, is due very largely to the extensive and thorough work of the ancient ice sheet within the state.

CHAPTER IV

SURFACE AND DRAINAGE

General surface features.—Illinois is a part of the Great Central Plain of North America. The relief of the state is not sufficient to form distinct physiographic areas nor to exert marked influence upon the climate. Illinois is but a portion of an extensive fertile plain.

Although flatness is characteristic of Illinois as a whole, local relief is sufficient in many parts of the state to interfere decidedly with the construction of highways and railroads. The general uniformity of surface is strikingly broken and varied by the valley trenches of the master-streams and their principal tributaries; by the extensive terminal moraines; by the Ozark Ridge; and by the long-continued erosive power of running water in the unglaciated areas of the state.

The highest point in the state, 1,241 feet above sea-level, is Charles Mound in Jo Daviess County, less than a mile from the Illinois-Wisconsin boundary line. The lowest point, 268 feet above the sea, is low-water mark at the junction of the Mississippi and Ohio rivers. The total relief of the state is thus 973 feet. The distance between these two places is 400 miles; the gradient, therefore, averages about $2\frac{1}{2}$ feet to the mile, or 1 foot to 2,000 feet, a slope so gentle as to be imperceptible to the eye and difficult of detection by instruments.

If, however, the traveler should motor from Charles Mound in Jo Daviess County to the river front at Cairo, he would find many miles of his route presenting other than the *average* gradient. Jo Daviess County alone has a maximum relief of 666 feet, and the traveler finds that the direction of the roads in the first section of his journey is controlled by the mature topography of the unglaciated area, where the relief of every square mile usually exceeds 100 feet. The roads are laid out to follow the gentler slopes and to cross the ridges at their lowest notches. Beyond the unglaciated area the roads begin to follow the section lines on the level prairie lands of the

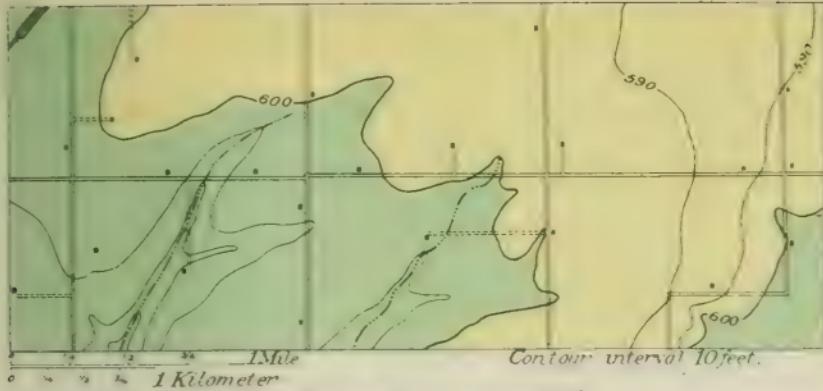
ground moraine of the great ice sheet. As the traveler approaches the broad, steep-sided valley of the Illinois River, he may find it necessary to make a detour of 20 miles or more to find a bridge. The bluffs on each side of the valley now determine the location of the highway until the journey has carried the traveler well beyond the immediate edge of the Illinois Valley. The long stretches of level country are somewhat broken by the shallow valleys of numerous small streams, while the larger valleys are deep enough to add variety to the landscape and to present steep gradients in the highway. In



VIEW NEAR TUNNEL HILL, JOHNSON COUNTY

Pasture fields are common on the level uplands and forested areas in the valleys of the Illinois Ozarks. (Copyright by Robert Ridgway.)

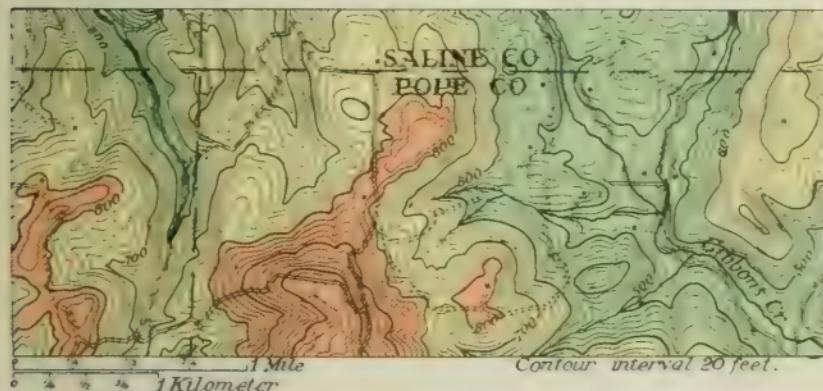
southern Illinois the traveler sees a long, even-topped ridge rising abruptly above the level plain, stretching to the east and west as far as the eye can see. The *Ozark Plateau* now controls the direction and the gradient of the highways, and for the remaining 40 or 50 miles of the journey the picturesque scenery, the steep and winding roadways, and the difficult fords at small streams lead the traveler to question whether Illinois is the level state so frequently mentioned in books. The route leads across the Illinois Ozarks, down the bluffs of the Ohio to Cairo, situated on the narrow strip of level land between the Ohio and Mississippi rivers. From the levee between the city and the Ohio, the traveler sees the river flowing 50 feet



Typical flat plain. From Lincoln quadrangle



Bluffs along Illinois River bottom. Peoria quadrangle



Bold relief in the Ozark hill country. Equality quadrangle

TOPOGRAPHIC MAPS OF FLAT PLAIN, RIVER BLUFFS, OZARK COUNTRY

Large areas of Illinois consist of flat plains with slight relief. The Illinois River bluffs are conspicuous topographic features within a plain of slight relief. The rocky uplift of the Ozark Ridge produces an area of rugged lands of considerable extent.

below the levee crest, if in the season of low water; if at flood time, he sees the widened stream stretching away to the Kentucky hills at a level well above the streets of the city, which are securely protected by huge levees built at great expense of labor and money.

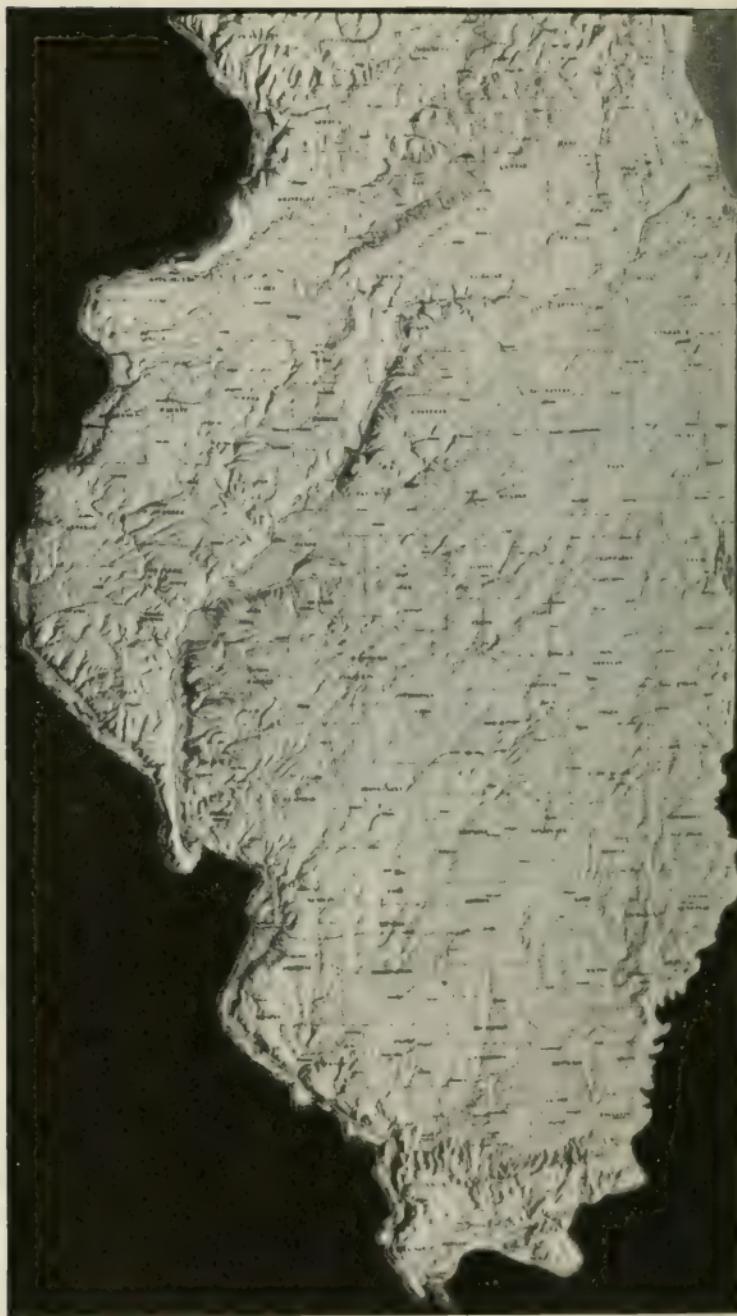
If we examine the surface of the state, county by county, we shall find that each county has a relief exceeding 100 feet. Among the larger counties, Iroquois has the least maximum



"BIG FOUR" RAILROAD TUNNEL, TUNNEL HILL, JOHNSON COUNTY

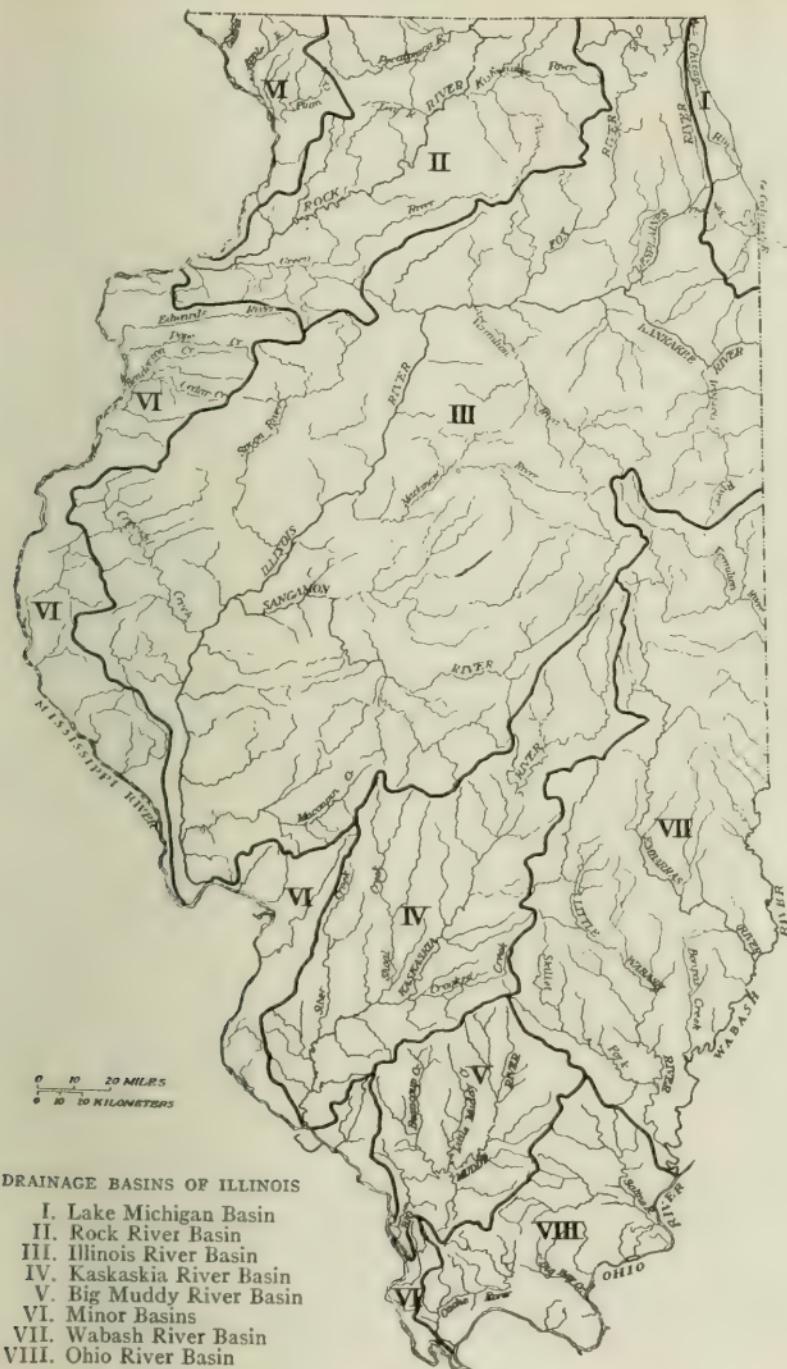
The difficulty of crossing the rugged Ozark Ridge by railroad is here met by driving a tunnel 900 feet in length through the solid rock. (Photograph by W. H. Simmons.)

relief, 130 feet, while Richland, a smaller county, has a maximum relief below that of any other county, 105 feet. Pope County has the greatest relief to be found within any county of the state. The descent from Williams Hill, 1,065 feet above sea-level, the highest point in the Illinois Ozarks, to the Ohio River, is 775 feet, with an average fall of 70 feet per mile, or an average of 1 foot to 75 feet. Among the Ozarks and along the highest river bluffs of the state the relief is frequently



PHOTOGRAPH OF RELIEF MODEL OF ILLINOIS

The strongest relief of the state is found in the unglaciated regions and along the larger stream valleys. (Model by M. Lorenz.)



200 to 300 feet or even more within the distance of a single mile. Although irregularities of surface are extensive and very effective in local control of highways, railroads, and industries, yet the state as a whole is noted for its gentle slopes, having a surface remarkably well adapted to the development of the world's greatest industry, agriculture, and to the building of highways and railroads for easy and rapid transportation to every part of the state.

Drainage basins.—The physical features of Illinois consist of a plain whose surface is varied somewhat by glacial moraines and stream valleys. Differences in altitude are not sufficiently marked to divide the state into distinct physical regions on the basis of elevation. It is possible, however, to divide the state into definite drainage areas. While divides between these basins may not be conspicuous, detailed maps make it possible to mark out their limits with accuracy. The entire state belongs to two large drainage regions: the Lake Michigan Basin and the Mississippi River Basin. The Mississippi Basin in Illinois may be further divided into a number of subordinate basins. The state may be divided as indicated in the accompanying table into eight regions.

DRAINAGE BASINS OF ILLINOIS

NUMBER ON DRAIN- AGE MAP	BASIN	AREA	
		Square Miles	Percentage of State
I.....	Lake Michigan	722	1.3
II.....	Rock River	5,310	9.5
III.....	Illinois River	24,040	43.0
IV.....	Kaskaskia River	5,710	10.2
V.....	Big Muddy River	2,230	4.0
VI.....	Minor Basins	6,488	11.5
VII.....	Wabash River	8,770	15.5
VIII.....	Ohio River	2,730	5.0
Total		56,000	100.0

Lake Michigan Basin.—The Lake Michigan Basin has the smallest area and the largest population of the eight drainage regions into which the state has been divided. It is

narrowest in Lake County where the divide between Lake Michigan and the Des Plaines River is within 4 to 6 miles of the lake shore. It widens southward to a width of 8 to 12 miles in the Chicago region, increasing in southern Cook County and northeastern Will County to a width of about 20 miles. The divide lies on the Valparaiso moraine near its inner margin, thus leaving the greater part of this moraine in the Illinois River Basin. The length of the divide from the Wisconsin boundary to the Indiana boundary is about 100 miles.

The area assigned to the Lake Michigan Basin, 722 square miles, is equal to a square whose sides are 27 miles in length, or to a circle whose diameter is 30 miles. The city of Chicago with an area of nearly 200 square



miles occupies 27 per cent of that part of the Lake Michigan Basin in Illinois. More than 40 per cent of the population of Illinois live on the 1.3 per cent of the area of the state included in the Lake Michigan Basin.

The chief topographic features of this drainage basin are the Chicago Plain and the inner portion of the Valparaiso moraine.

The Chicago Plain extends from Winnetka southward to the Indiana boundary and eastward into Indiana around the head of Lake Michigan. It is the bottom of the ancient glacial lake, Lake Chicago, the ancestor of Lake Michigan, which formed to the southward of the great ice sheet and discharged its waters across the Valparaiso moraine through

the Chicago Outlet, the present valley of the Des Plaines River. The Chicago Plain is flat with occasional low sand dunes and a few remnants of the Valparaiso moraine.



CALUMET RIVER, SOUTH OF LAKE CALUMET,
COOK COUNTY

The streams of the Chicago Plain are small, shallow, and sluggish. Only at great expenditure of money and labor have their lower courses been made into deep and commodious harbors suitable for large vessels. (Photograph by W. D. Jones.)

The natural drainage of the Chicago Plain is through the Chicago and Calumet rivers and their tributaries. The North Branch of the Chicago River and the South Branch of the Chicago River unite

near Market and South Water streets in the city of Chicago, forming the Chicago River which extends eastward $1\frac{1}{4}$ miles to Lake Michigan. Under natural conditions the waters of these streams flowed with sluggish current into the lake. With the opening of the Chicago Drainage Canal in 1900 the currents of the Chicago River and of the South Branch were reversed, and sufficient water from Lake Michigan has since been flowing westward and southwestward across the natural divide at Summit into the Des Plaines River at Lockport to

give the city of Chicago proper drainage, and to insure a supply of good water from the lake.

The Grand Calumet flows with sluggish current from the sand dunes of Indiana through Gary and Hammond, Indiana, and through South Chicago to Lake Michigan. The Little Calumet enters Illinois from Indiana flowing northwestward; it makes a sharp bend to the east and joins the Grand Calumet at the southern edge of Chicago. Lake Calumet, Hyde Lake, and Wolf Lake are shallow lakes connected with the Grand Calumet River.



SAG OUTLET AND SLOPE OF MOUNT FOREST ISLAND

The level land in this scene was the bed of a stream of flowing water while Lake Chicago was pouring its waters across the present divide to the Illinois Valley. The higher land at the left of the scene is the margin of Mount Forest Island which was not covered by the waters of Lake Chicago. (Photograph by W. D. Jones.)

The indefiniteness of the divide between the Lake Michigan and Illinois River basins is strikingly shown in various ways. In pioneer days a continuous passage for boats was found at times of high water along the Chicago portage between the Des Plaines River and the South Branch of the Chicago River. No great difficulty was experienced in digging the Illinois and Michigan Canal across the divide at Summit; nor in furnishing the canal with a water supply through the "Canal Feeder" constructed across the low divide in the "Sag." The Sag is a broad valley once occupied by water flowing from Lake Chicago and separated from the Chicago Outlet, or Des

Plaines Valley, by Mount Forest Island. The observant traveler can see and appreciate these topographic relationships today as he is carried swiftly on the railroad along the tedious water route followed by Joliet and Marquette in 1673.

That portion of the Valparaiso moraine which lies in the Lake Michigan Basin is divided into two parts by the Chicago Outlet. The narrow belt to the north, between the divide and the lake, consists of a series of morainic ridges drained by short, wet-weather streams which have cut deep V-shaped gullies into the lake bluff north of Winnetka, and by the upper course of the North Branch of the Chicago River. The lake shore from the Wisconsin boundary line to the city limits of Chicago, a distance of 36 miles, is occupied by cities and villages at intervals of about two miles. Excellent railroad service makes possible this remarkable series of residential suburbs along the lake. Here many thousands of people have homes situated on beautiful sites, with healthful surroundings, and with easy access to the great city.

The Valparaiso moraine to the south of the Chicago Outlet is drained on its inner border by short streams tributary to the Little Calumet River. Valparaiso and Laporte, Indiana, are in the Kankakee Basin, while Chicago Heights, Illinois, Hammond, Gary, and Michigan City, Indiana, are in the Lake Michigan Basin.

Rock River Basin.—Rock River rises in Fond du Lac County, about 20 miles south of Oshkosh, Wisconsin. It flows southwestward and empties into the Mississippi 6 miles below Rock Island, Illinois. The length of the river is 285 miles, and the length of the basin 175 miles. The total area of the basin, 10,800 square miles, is almost equally divided between Wisconsin and Illinois. The stream has an elevation of 1,000 feet at its source and 540 feet at its mouth. The width of the basin on the state line is 75 miles, about one-half the width of the state along the northern boundary. The basin lies mainly in the Iowan and pre-Iowan glacial deposits.

The Pecatonica River flows through Freeport and joins the Rock River at the village of Rockton, near the state line. Kishwaukee Creek, on which Belvidere is located, is an eastern tributary which joins the Rock a few miles below Rockford.

Green River, the most important tributary of the Rock, flows from DeKalb County to Rock Island County, and drains the southern portion of the Rock River Basin in Illinois.

The course of Rock River has determined the location of several important cities. On its banks are found Janesville and Beloit in Wisconsin; Rockford, the fifth city of Illinois in population; and the smaller but important cities of Oregon,



ROCK RIVER NEAR OREGON, OGLE COUNTY

Dixon, Sterling, and Rock Falls. Rock Island and Moline are large cities on the Mississippi just above the mouth of Rock River.

Glaciation produced profound changes in preglacial drainage. Rock River Basin furnishes evidence of great changes in drainage lines. From Janesville, Wisconsin, to the mouth of Kishwaukee Creek, Rock River flows in a broad *preglacial* valley which continues southward, joining the Illinois Valley at Great Bend near Hennepin. Rock River, however, turns

southwestward at the junction of Kishwaukee Creek and flows through a narrow *post-glacial* valley to Sterling, where it enters the broad plains occupied also by Green River. In its course from Kishwaukee Creek to Sterling the river has cut across stretches of solid rock and thereby produced much picturesque scenery.

Between Rock River and the Driftless Area of Jo Daviess County, the glacial drift is so thin that many small streams have deepened their valleys into the underlying bedrock, carving out numerous rock gorges. The greater part of the basin consists of undulating prairie lands with woodlands along the streams. Few of the hilltops are more than 100 feet above the intervening valleys.

The moraines of the Iowan glaciation are low and inconspicuous in the general surface, but a more rugged morainic topography occurs where the Rock River Basin occupies the outer margins of the Valparaiso and Bloomington moraines of the Wisconsin glaciation. A number of eskers are found in the Rock River Basin. The largest and best-defined is the Leaf River or Adeline esker in northern Ogle County. It is found in the valley of Leaf River, a western tributary of the Rock, and the village of Adeline is located on the esker near its eastern end. This esker is 12 miles in length; from 100 to 1,000 feet wide; and it rises from 20 feet to 100 feet above the level land on either side. The Hazelhurst esker is on the border between Ogle and Carroll counties. The Garden Plain esker is in Whiteside County, and numerous esker-like ridges are found in Stephenson County.

The flat land of the basin is found along the lower course of Rock River and in most of the Green River Basin. These flat lands were originally extensive swamps which have been largely reclaimed by expensive drainage systems.

Illinois River system.—The Illinois River is the most important tributary of the Mississippi above the Missouri, and the Ohio is the only eastern tributary of greater importance. The Illinois River lies wholly within the state, but the Des Plaines and Kankakee rivers which unite at the eastern edge of Grundy County to form the Illinois have their sources in Wisconsin and Indiana respectively.

From its source the Illinois River flows almost due westward for 63 miles across Grundy and La Salle counties to the Great Bend at Hennepin in Putnam County. Here the stream bends sharply to the southward. After crossing Putnam County its course is southwestward to the northern edge of Pike County. The stream then flows almost due south to the southern part of Calhoun County, where another sharp bend gives the last few miles of its source an easterly direction to its confluence with the Mississippi River. The Illinois River joins the Mississippi at Grafton, 24 miles above the mouth of the Missouri, 215 miles from the Great Bend, and 278 miles from the confluence of the Des Plaines and Kankakee rivers.

The Des Plaines River rises in Racine County, Wisconsin. Its length is about 110 miles, 20 of which are in Wisconsin. Joliet is the largest city on the Des Plaines. The Kankakee River rises near South Bend, Indiana. It has a length of 135 miles, more than half of which is in Indiana. Momence and Kankakee are located on this stream.

The total stream length along which water may flow within the Illinois River Basin is more than 400 miles.

The Illinois River has a fall of 50 feet in the 63 miles of its course to the Great Bend, or an average of 10 inches per mile. At Marseilles, however, the fall amounts to 18 feet in $1\frac{1}{2}$ miles, and this makes possible the large water-power development at Marseilles. The fall in the 215 miles from the Great Bend to the Mississippi is only 25 feet, or but little more than 1 inch per mile. The lower course of the Illinois River thus furnishes conditions favorable for navigation but not for power, while the upper course has favorable conditions for power development, but not for navigation except by additional canal construction.

The width of the Illinois Valley in its upper course is from 1 to $1\frac{1}{2}$ miles, while the width below the Great Bend varies from little more than 1 mile at Peoria to more than 7 miles at Chillicothe and to 15 miles near the mouth of the Sangamon.

The valley sides also vary in height and steepness, depending on the nature of the land through which the stream flows. They are low and inconspicuous in the flat swamp lands of Grundy County; high and precipitous where the stream has

THE GEOGRAPHY OF ILLINOIS

cut through solid rock as at Starved Rock; terraced or steeply sloping where the material of the upland is mainly glacial drift. The sandstone bluffs of the Starved Rock region are about 120 feet above the river in ordinary stages of water. In the Peoria region and below, the bluffs in places rise 150 to 250 feet or more above the valley floor.



ILLINOIS RIVER FROM SUMMIT OF STARVED ROCK

The Illinois River Valley was a favorite route of travel for the Indians, the early explorers, and the early settlers. Joliet, Marquette, La Salle, and Tonti all traversed the region shown in this scene.

The Illinois River and Valley have determined the location of numerous cities, some of which are Morris, Marseilles, Ottawa, La Salle, Peru, Spring Valley, Hennepin, Chillicothe, Peoria, Pekin, Havana, and Beardstown.

The Illinois River receives important tributaries from both sides. The Fox River rises in Waukesha County, Wisconsin, flows south and southwest and joins the Illinois at Ottawa. The principal lake region of Illinois is in Lake



ILLINOIS RIVER VALLEY, LOOKING EAST FROM STARVED ROCK STATE PARK

The precipitous sides and comparatively barren crests of the cliffs of St. Peter sandstone maintain a moderate growth of forest trees along the sides of the valley.
(Photograph by Helen M. Strong.)



VERMILION RIVER AT DEER PARK, LA SALLE COUNTY

The natural vegetation in this scene is typical of the wooded areas along stream valleys in the Illinois prairies. (Copyright by Keystone View Company.)

County along Fox River and its tributaries. Elgin, St. Charles, Geneva, Batavia, and Aurora are located on Fox River within a distance of 25 miles. The Vermilion River joins the Illinois from the south at La Salle. It flows through Pontiac and Streator. It sometimes is called the Illinois-Vermilion to distinguish it from the Wabash-Vermilion which flows through Danville and is tributary to the Wabash.

The Mackinaw River is an eastern tributary joining the Illinois just below Pekin. Spoon River is a western tributary entering the Illinois near Havana. The Sangamon in its lower course is the boundary between Mason and Cass counties; Decatur is located on the Sangamon, and Springfield a few miles from it. Bloomington and Lincoln are in the basin of the Sangamon. Crooked Creek flows between Schuyler and Brown counties; and Macoupin Creek joins the Illinois between Greene and Jersey counties.

Illinois River Basin.—The Illinois River Basin is the state's largest and most important physiographic region. It lies athwart the state in a northeast-southwest direction, forming a huge, roughly rectangular area 250 miles long and 100 miles wide. At the northeast the rectangle is not closed, but two armlike extensions project into the neighboring states of Wisconsin and Indiana.

The Kankakee takes its course somewhat to the north of the center of the Indiana arm, and receives from the south its principal tributary, the Iroquois, which joins the Kankakee at its southernmost bend. The Kankakee Basin is one of the largest areas of exceedingly flat land in Illinois. Its original swamps have been drained for the most part, and level areas of fertile farm lands stretch away in the distance as far as the eye can see. Extensive and expensive drainage systems have made the soil available for agriculture, and the application of the principles of scientific agriculture has given phenomenal increase to crop yields on a soil peculiarly rich in all but one of the plant-food elements.

The basins of the Iroquois and Kankakee proper are separated by an arm of the Valparaiso moraine. The Kankakee is separated from the Lake Michigan and Des Plaines basins by the broad, bulky, and rugged ridges of the main

body of the Valparaiso moraine which rises to a height of 200 feet or more above the flat lands to the south and west.

The Des Plaines River flows along the eastern edge, and Fox River flows along the western edge, of the Wisconsin arm of the Illinois River Basin, within the broad belt of the Valparaiso moraine. The Des Plaines breaks across the moraine along the Chicago Outlet, and the Fox works its way to the western edge of the moraine near Aurora. The surface formations of this region are in striking contrast to those of the main part of the Kankakee Basin. The chief topographic feature is the Valparaiso moraine whose broad north-south ridges, separated by stream valleys or by more level areas of glacial till, occupy a width of more than 20 miles, and rise to a height of 300 feet above Lake Michigan.

The only important lake district of Illinois lies in the Valparaiso moraine of Lake County where the typical irregularities of morainal topography furnish numerous small basins which contain bodies of water varying in size from mere ponds to several square miles in extent. Good railroad service and excellent automobile routes between Chicago and this region are leading to development of summer resorts and summer homes on the shores of many of the lakes.

For a distance of 278 miles from the confluence of the Des Plaines and the Kankakee, the Illinois River trenches its basin somewhat to the north and west of a middle line. The most conspicuous topographic feature of the basin is the valley itself, having a width varying from 1 to 15 miles, bordered by valley sides varying in height from low ridges to precipitous or sloping bluffs rising 100, 200, or even 300 feet above the valley floor. The long stretches of the Illinois Valley not spanned by wagon bridge or railroad bridge indicate the strong control of this important valley on transportation routes. Wagon bridges have been built only where they give direct approach to a city of some importance. The only wagon bridges across the 215 miles of the valley below the Great Bend are at Chillicothe, Peoria, Pekin, Havana, and Beardstown. Ferryboats still operate at many intervening points. Railroad bridges are more numerous than wagon bridges.

The flood plain of the Illinois Valley contains large areas of swamp lands, some of which have been reclaimed by levees built at great expense. As land values increase, additional portions will doubtless be drained. Numerous lakes, portions of former river courses, are found on the flood plain, and in many instances they yield a fish product as valuable as the farm products from an equal area of good agricultural land.

The tributary valleys of the Illinois and their numerous subdivisions form a network of valleys throughout the entire basin, and everywhere they are important topographic features

of the landscape. They furnish necessary drainage lines; contain in most cases a fertile soil; suffer occasionally from high water; and require large expenditures for highway and railroad crossings. The traveler who understands the development and significance of stream valleys will find much to interest and to instruct him as he journeys across Illinois whether by railroad or motor car.



DREDGE BOAT USED IN BUILDING LEVEES IN
ILLINOIS RIVER SWAMPS

Large areas of swamp lands in the flood plains of Illinois streams are capable of reclamation by extensive systems of levees, the building of which is made possible by the dredge boat.

Next to the stream valleys, the most conspicuous topographic features within the Illinois Basin are the various glacial moraines. These ridges of glacial drift lend variety to an otherwise flat landscape. The Illinois Basin contains large portions of all the important systems of glacial moraines in the state—Illinoisan, Early Wisconsin, and Late Wisconsin—Nos. 2, 9, and 10 of the soil map (facing p. 152). These terminal moraines rise in ridges of gentle or even rugged topography above the more level ground moraines on either side. They are usually distinct and easily traced by the observer. They may appear as low mounds; as short narrow ridges either single or branching; or they may be hundreds of miles in length, 10 to 20 miles in width, and 200 feet or more above the level ground

moraine. With the soil map for reference, the traveler may see and understand these ridges and their significance even when traveling rapidly through the state. The Illinois Basin as a whole is a region of rather flat land, but the slope is everywhere sufficient to insure good drainage except in the flood plains of the main valley and some of its tributaries. Its area of 28,000 square miles is divided among three states as follows: Illinois contains 24,000 square miles; Indiana 3,000 square miles; and Wisconsin 1,000 square miles. The basin forms an extensive area of extremely fertile agricultural land which, under the Illinois system of scientific agriculture, is destined to remain one of the great food-producing regions of the world.

Kaskaskia River Basin.—The Kaskaskia River is also known as the Okaw. It rises in Champaign County where the watersheds of the Wabash, Kaskaskia, and Illinois basins meet. The river flows southwestward and joins the Mississippi in Randolph County.

Shelbyville and Vandalia are located on the Kaskaskia River; Hillsboro is on Shoal Creek, the most important western tributary; and Centralia on Crooked Creek, the principal eastern tributary. Belleville and Waterloo are on the divide between the Kaskaskia and Mississippi.

The basin of the Kaskaskia is about 190 miles in length, but the river, which is very crooked, has a length of nearly 400 miles. The average width of the basin is 30 miles and its extreme width about 60 miles. Its area is 5,710 square miles. The basin lies in the Lower Illinoian, Middle Illinoian, and Early Wisconsin glaciations. Swamp and overflow lands are common in the valley of the river. The surface of the basin is decidedly level, varied somewhat by the stream valleys, kames, and moraines. A group of glacial ridges known as kames extends from Jackson and Randolph counties through St. Clair County and on to Tower Hill in Shelby County. They are long, narrow ridges or smaller knolls rising abruptly from the level plain to heights of 75 to 130 feet. Their distribution is well shown on the soil map.

The Shelbyville moraine is the outer margin of the Wisconsin glaciation. It extends from Indiana westward across

Illinois to Shelbyville, the city which has given its name to the moraine. Here the moraine turns abruptly northward. In Peoria County it is overridden by the Bloomington moraine formed at a later stage of the Early Wisconsin glaciation. The Shelbyville moraine rises 60 to 100 feet above the level lands of the Illinoian glaciation. It forms a striking feature in the landscape when seen from the south, but it passes more gradually into the level ground moraine to the north. The moraine is cut by the Kaskaskia at Shelbyville. Southward from the Shelbyville bridge the valley presents the characteristics of a broad, well-matured valley, while northward it appears much younger. The two drift sheets in which the valley lies differ widely in age and topography, thus giving a sudden change to the appearance of the stream valley.

The Kaskaskia Valley is of historic note as it contains the site of the earliest permanent Illinois settlement and is the seat of the first two capital cities of the state.

Big Muddy River Basin.—The Big Muddy River flows along the eastern and southern parts of its basin; the Little Muddy along the center; and Beaucoup Creek along the western part. The basin is somewhat elliptical in shape with its axes about 70 miles and 50 miles in length. The area is 2,230 square miles. Most of the surface is level except for the numerous shallow trenches cut by the streams. In the southern part of the basin, however, the topography changes rapidly from the level plains of the Illinois glaciation to the rugged lands of the Illinois Ozarks. The traveler whose impressions of Illinois topography have been gained from journeys in the central part of the state will find unexpected variety in a journey of only a few miles southward from Carbondale among the narrow defiles and precipitous cliffs of Bosky Dell and Makanda.

Rich coal deposits underlie the basin of the Big Muddy, and the mines of this region are among the most productive of the state. A number of important cities are found within the basin. In the eastern part are Mount Vernon, Benton, Johnston City, and Marion; in the southern portion Herrin, Carterville, Carbondale, and Murphysboro; in the northwest Duquoin and Pinckneyville.

Minor basins of the Mississippi.—Areas of considerable extent are a part of the Mississippi Basin, but are not included in the basins already described. These lie along the western edge of the state, including nearly all the Illinois bluffs of the



MISSISSIPPI FLOOD PLAIN AND ROCKY BLUFFS, JACKSON COUNTY

The abrupt change from level flood plain to precipitous bluff frequently determines, as here, the location of roadways and homes near the foot of the bluff on that part of the plain least likely to be flooded. (Copyright by Keystone View Company.)

Mississippi with triangular-shaped areas extending eastward from 10 to 50 miles. They include much of the most rugged and most picturesque scenery of the state. The immediate bluffs rise to heights of 100, 200, and 300 feet, or more, above the flood plain of the Mississippi.

The Driftless Area of northwestern Illinois, which includes nearly all of Jo Daviess County and small areas of Stephenson and Carroll counties, is equaled in ruggedness of topography only by the Ozarks of the southern part of the state. The land surface presents a mature topography. Slopes of considerable steepness occur throughout the unglaciated region. Galena, Apple, and Plum rivers are the principal streams of Jo Daviess and Carroll counties. Galena is the principal city. Lead and zinc mining is carried on in the Driftless Area.

In Whiteside County, and in Rock Island County to the mouth of Rock River, the Rock River Basin approaches very near to the Mississippi bluffs. Fulton, East Moline, Moline, and Rock Island are located on small upland areas with lower lands on all sides. Edwards River, Pope Creek, and Henderson River, which enter the Mississippi in Mercer and Henderson counties, are the longest streams of the minor basins of the Mississippi. Edwards River drains land more than 50 miles from the Mississippi.

Hamilton, in Hancock County, is at the Illinois end of the great Keokuk dam. Warsaw is located on the Mississippi a few miles below Hamilton. Quincy, for many years the largest city of Illinois on the Mississippi, has recently been outstripped by East St. Louis.

The unglaciated region of Pike and Calhoun counties forms a narrow, rugged, elevated ridge which separates the Mississippi and Illinois rivers. This line of upheaval extends east of the Illinois through southern Jersey County into Madison County.

A narrow limestone ridge extends from St. Clair County through Monroe and Randolph counties to Jackson County, where it joins the main ridge of the Illinois Ozarks. This ridge is from 5 to 10 miles wide and stands 100 to 200 feet above the level plains of the Kaskaskia and Big Muddy basins. The region has numerous caves. The surface is thickly dotted with sink holes characteristic of limestone regions with underground drainage. This long, narrow ridge is broken only at two places where the Kaskaskia and Big Muddy flow across it in water gaps less than 2 miles in width. As the traveler journeys southward from East St. Louis on the St. Louis,

Iron Mountain, and Southern Railroad, he may observe this precipitous ridge which rises to the east as an object of beauty and grandeur. The river gaps are also clearly noticeable.

The term "American Bottoms" is applied to that part of the Mississippi flood plain in Illinois extending southward from the bluffs at Alton. It is commonly applied to the exceptionally wide portion extending from Alton to Prairie du Pont Creek in St. Clair County. In this region the average width is about 7 miles. The name is also applied to all the Mississippi flood plain in Illinois from Alton to Cairo at the mouth of the Ohio. On this broad valley floor in Madison and St. Clair counties are Granite City, Madison, Venice, and East St. Louis. This populous district is protected by an elaborate system of levees.

The flood plain of the Mississippi is noted in the pioneer history of Illinois. Cahokia, one of the first permanent settlements, now a small village, is located about 4 miles south of East St. Louis. Old Fort Chartres, now a state park, is in northwestern Randolph County near Prairie du Rocher. Old Kaskaskia, the first permanent settlement in Illinois, and once the metropolis of the Mississippi Valley, occupied a site which now lies in the bed of the present main channel of the Mississippi River.

Wabash River Basin.—The Wabash River rises in the western part of Ohio, flows west and southwest across Indiana, and from a point 15 miles below Terre Haute, Indiana, to its junction with the Ohio River, forms the Illinois-Indiana boundary line. Of the 33,000 square miles of the Wabash River Basin, 8,770 square miles are in Illinois. There are several important Illinois tributaries. The Vermilion, on which Danville is located, flows across a portion of Indiana to reach the Wabash. The Embarras is one of a group of streams which have their sources in the vicinity of Champaign and Urbana, and radiate in various directions to widely separated regions of the state. The Embarras flows southward through Champaign, Douglas, Coles, Cumberland, and Jasper counties, then southeastward, touching Richland County and crossing Crawford and Lawrence counties. Along its course are Newton and Lawrenceville; within its basin are Tuscola,

Charleston, and Bridgeport. Bonpas Creek enters the Wabash at Grayville.

The Little Wabash rises near Mattoon and flows southward nearly parallel with the Embarras, about 25 miles farther west. It joins the Wabash between White and Gallatin counties 15 miles above the Ohio. Skillet Fork is an important western tributary of the Little Wabash. Effingham, Louisville, and Carmi are on or near the Little Wabash. Olney and Fairfield are on tributaries.

The Wabash River Basin in Illinois occupies portions of the Early Wisconsin and Lower Illinoian glaciations. The surface features of the northern portion consist of the level ground moraines of the Early Wisconsin, varied by numerous ridges of the Bloomington, Champaign, and Shelbyville terminal moraines. The topography of the southern portion is exceedingly flat throughout as there is but slight development of moraines. In extensive areas not a knoll as much as 10 feet in height is to be found. This general flatness is interrupted, however, by the broad, shallow trenches of well-developed stream valleys. The bluffs and flood plain of the Wabash are important topographic features of this part of Illinois.

Ohio River Basin.—That part of Illinois which drains directly into the Ohio has an area of 2,730 square miles, and it contains the most rugged topography of the state, the Illinois Ozarks.

The Saline River and its tributaries reach northward in the level Lower Illinoian glaciation to Hamilton County and southward to the crest of the Ozarks. Its basin has an area of 1,130 square miles. Harrisburg and Eldorado are in one of the most productive coal regions of the state.

Cache Valley, once occupied by the Ohio River, extends between two highland areas across Pope County, along the edges of Johnson, Union, Massac, Pulaski, and Alexander counties, and unites with the flood plains of both the Mississippi and Ohio. The eastern end of the valley is drained by Big Bay Creek, which rises in Johnson County and flows eastward across Pope County to the Ohio. Its basin has an area of 275 square miles. The larger part of the valley is drained by Cache River, which rises in the highlands to the north;

enters the valley in Massac County; flows westward and southward, joining the Ohio between Mound City and Cairo. The basin of the Cache River has an area of 623 square miles.

The divide between Big Bay Creek and Cache River lies in the swamp and overflow lands of the Cache Valley. So slight is this divide that a deep ditch in Big Bay Creek has been extended westward far enough to reverse a part of the natural drainage of the Cache River system.

The Ohio River is an important transportation route. The county seats of the six Illinois counties along the 126 miles of the Ohio are all river ports. These are Shawneetown, Elizabethtown, Golconda, Metropolis, Mound City, and Cairo.

Rugged areas of Illinois.—Although Illinois is characterized by slight relief and broad areas of level lands, there are a few regions of sufficient ruggedness to merit special mention and to attract the attention of tourists who wish to visit those portions of Illinois presenting scenery in striking contrast to the flat prairie lands of the rich agricultural districts. The state-aid system of good roads leads into every county of the state, and these picturesque regions will thus be opened to automobile parties for easy and profitable exploration.

The Ozark Ridge.—The Ozark Highland, of which the Illinois Ozarks is a spur, is the most conspicuous elevated region between the Appalachian and the Rocky mountains. Its area of 50,000 square miles is shared by five states, with 33,000 square miles in southern Missouri, 13,000 in northern Arkansas, 3,000 in northeastern Oklahoma, and the remaining 1,000 square miles in southern Illinois and southeastern Kansas, the area in Illinois being larger than that in Kansas. The Ozark Ridge of southern Illinois is the most conspicuous single topographic feature in the state. It extends eastward across the state from the flood plains of the Big Muddy and Mississippi rivers in Jackson and Union counties to the flood plains of the Saline and Ohio rivers in Gallatin and Hardin counties, a distance of about 70 miles. Its northern edge extends east-west in the southern portions of Jackson, Williamson, Saline, and Gallatin counties, while the southern edge is found along a more irregular line across the southern portions

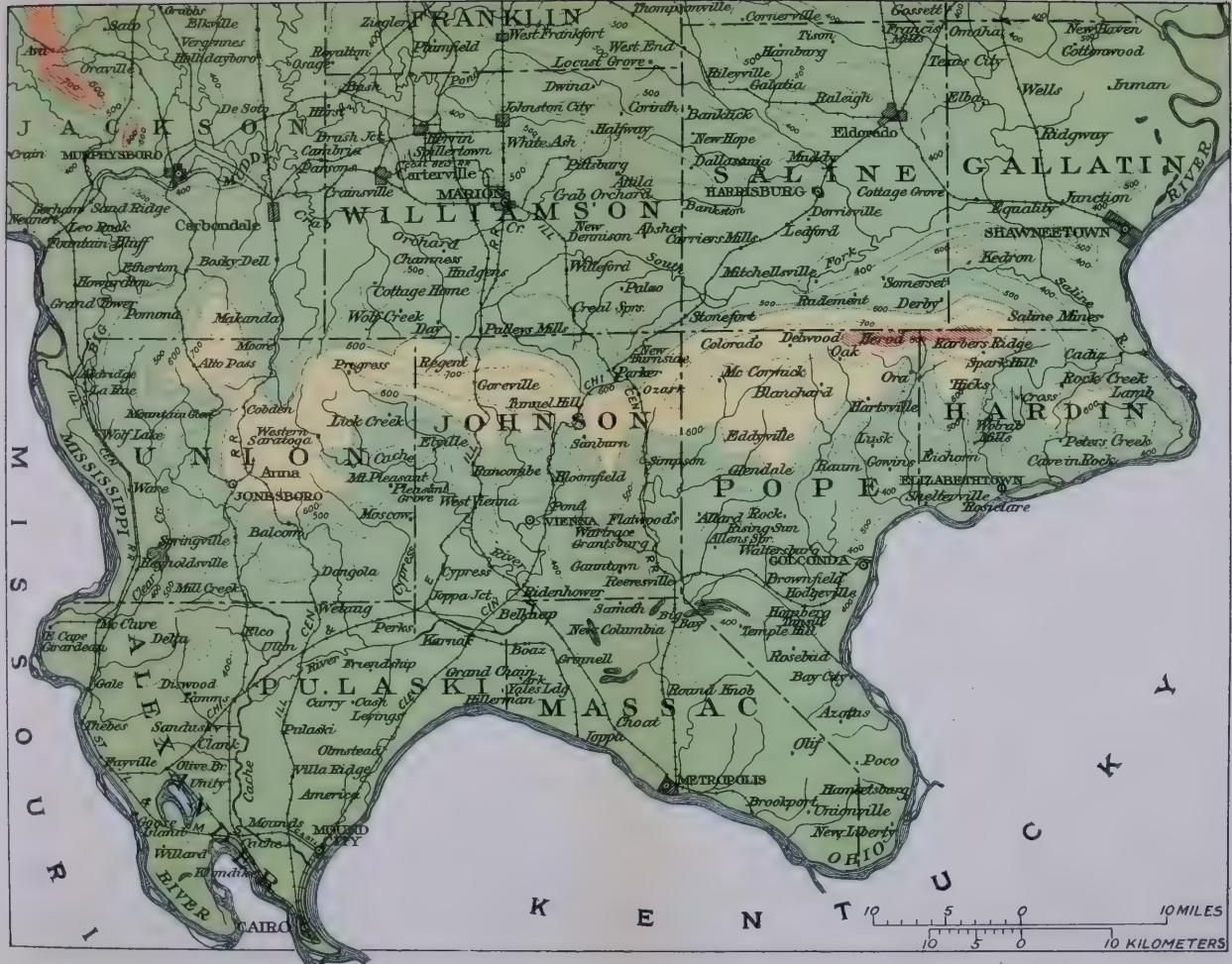
of Union, Johnson, Pope, and Hardin counties. To the north lie the lower lands of the Big Muddy and Saline river basins, and to the south the bottom lands of the Ohio, Big Bay, and Cache rivers. The axis of the ridge thus lies along an east-west line in the northern portions of the four counties last named. A rectangle 70 miles in east-west extent and 12 miles in north-south dimension includes nearly all of the highlands of the Ozark Ridge in Illinois and considerable areas of lowlands



TYPICAL VIEW OF THE OZARK HILLS ABOUT THREE MILES WEST
OF EDDYVILLE, POPE COUNTY

The rugged Ozarks may present barren rocks, forested areas, or fairly good farm lands. The presence of the rail fence indicates an important local use of the timber. (Photograph by Clarence Bonnell.)

along the stream valleys. The area, more than 600 feet above sea-level, is nearly 400 square miles in extent, and the total area, more than 500 feet in elevation, is about twice as large. The crest of the ridge, in at least four areas, rises above 700 feet, with the culminating peak, Williams' Hill in northeastern Pope County, rising to an altitude of 1,065 feet above sea-level, and more than 700 feet above the Ohio River 12 miles distant.



PHYSICAL MAP OF THE OZARKS

The highest point in the Illinois Ozarks is Williams' Hill, 1,065 feet, in northeastern Pope County. No point in Illinois between the Ozark Ridge and the rugged lands of Jo Daviess County reaches the 1,000-foot level.

The Ozark Ridge rises somewhat abruptly from the bordering lowlands to elevations of 300 to 700 feet above the plains. Short, swift streams have eroded much of the area into rugged hills and ridges with numerous valleys. Some of these valleys are so narrow and steep that no bottom lands have yet been developed; others contain bottom lands of sufficient area to provide fertile farms. The ridges are in places too narrow and too rugged for cultivation, while in other portions, where stream erosion has not yet fully dissected the uplands, relatively large areas are capable of profitable cultivation. The topography, climate, and soil of certain portions of the Illinois Ozarks are well adapted to fruit growing, and orchards have been developed with profit.

A narrow spur extends southward from the main ridge in Jackson County into the northern portion of Alexander County between the Cache and Mississippi rivers. In the southern portions of Pulaski, Massac, and

Pope counties, rugged hills and ridges are found between the broad flood plains of Cache and Big Bay rivers on the north and the Ohio River on the south. These detached highland areas are a part of the Ozark system. Small detached hills and ridges of solid rock are also found in the Mississippi flood plain in Jackson County and in the lowlands near the Saline and Ohio rivers in Gallatin and Hardin counties. Sink holes and caves are found in some of the limestone regions of the Illinois Ozarks. The village of "Cave-in-Rock" in Hardin County is so named because of the presence of a large cave in the rocks along the Ohio River near the village.

From the western end of the Ozark Ridge in Jackson County, a long, narrow, rugged belt of limestone rocks extends northwestward between the Mississippi flood plain on the



COUNTRY HOME AMONG THE OZARKS NEAR
TUNNEL HILL, JOHNSON COUNTY

(Photograph by W. H. Simmons)

west and the coal-producing regions to the east, crossing the Mississippi River south of East St. Louis. It rises 300 to 400 feet above the Mississippi and 200 to 300 feet above the plains to the east. The ridge is 5 to 10 miles wide and is continuous throughout its extent of about 80 miles in Illinois except for two gaps, each not more than 2 miles in width, made by the Big Muddy and Kaskaskia rivers. In this limestone ridge sink holes and caves are common, and underground drainage through these sink holes and caves prevents the development of systematic valley systems on the surface. This rugged belt has an elevation of 650 to 750 feet above sea-level. It forms the eastern edge of the extensive Ozark Highland which has its chief development on the opposite side of the Mississippi in southern Missouri. The narrow belt in Illinois has been severed from the main highland by the Mississippi River.

The topographic control of the Ozark Ridge on the courses of streams and on the location and direction of highways and railroads is very marked. No stream within the state crosses the highland in a north-south direction. Short, swift streams flow down the steep northern slope to the Big Muddy and Saline rivers. The rapid streams on the south slope of the main ridge carry their waters quickly to the sluggish Cache River and Big Bay Creek, which occupy an abandoned channel of the Ohio. No railroad traverses the Ozark region along an east-west line. Low passes are sought, for north-south lines, and at Tunnel Hill in Johnson County a railroad tunnel, 900 feet in length, has been driven through solid rock. Highways seek the lowest passes and the easiest grades which, at their best, are difficult of ascent.

Other rugged areas.—Near the junction of the Illinois and Mississippi rivers, a geological uplift has given rise to rugged lands in Jersey, Calhoun, and Pike counties. Just east of the mouth of the Illinois River, a few points have an altitude of more than 800 feet above sea-level. The rugged ridge of Calhoun County and southern Pike County is 700 to 750 feet above sea-level.

In the northwestern part of Illinois, including Jo Daviess County and portions of Stephenson and Carroll counties, is

found the rugged land of the Driftless Area, which is more extensive in Wisconsin than in Illinois. "Mounds" and "knobs" are more characteristic of the topography of this region than ridges. Charles Mound, 1,241 feet above sea-level, in Jo Daviess County near the state line, is the highest point within Illinois. These mounds rise 75 to 300 feet above the more level land of the region, and vary in size from a few acres to several square miles. The numerous mounds and well-developed drainage systems make this region one of varied topography.

These rugged areas of Illinois together with the river bluffs of the main streams, especially the Illinois, Mississippi, and Ohio, furnish a greater variety of interesting and picturesque scenery than is usually credited to the Prairie State.

Summary.—While Illinois is rightly considered as a part of a flat plain, its surface features are sufficiently extensive and varied to present striking contrasts of scenery and of land values. While the swamps and shallow lakes of the Illinois uplands have been drained and turned into fertile fields, there still remain numerous difficult and expensive reclamation projects along the flood plains of bordering and of state streams. Twenty-three of the forty-eight states of the nation furnish water which flows across Illinois or along the borders of the state. Populous commercial centers so located as to be subject to flood damage must ever apply the best methods of securing protection against the floods which come from time to time.

CHAPTER V

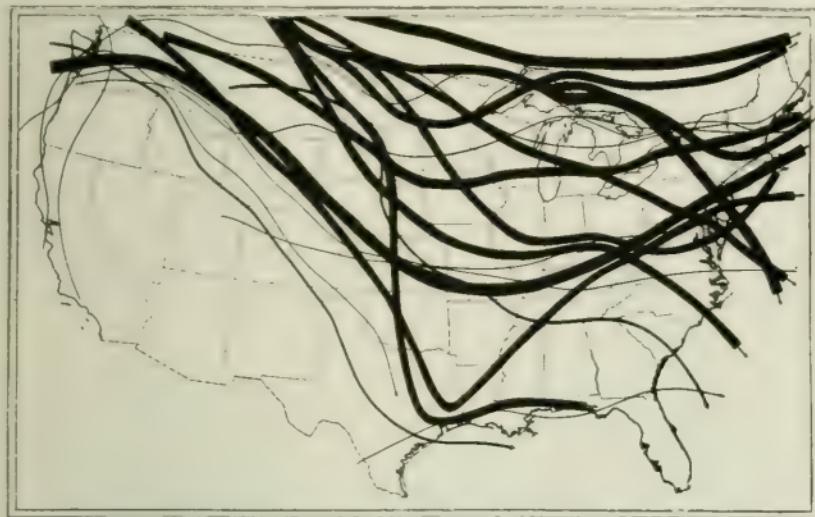
WEATHER AND CLIMATE

Illinois weather and climate.—Illinois experiences the weather and climate characteristic of middle latitudes in the interior of continents. It lies nearer the equator than the pole. The fortieth parallel passes through the central part of the state. This latitude insures long days and steep sun's rays in summer with abundant warmth and sunshine for the growth of staple food crops. It also insures short days and slanting rays in winter with cold weather, for which provision must be made during the preceding summer. The latitude of Illinois places it throughout the year in the belt of the prevailing westerly winds, whose usual direction is interrupted at intervals of a few days by the passage of low-pressure areas, or cyclonic storms, of large extent, averaging about 500 miles in diameter. These cyclones carry rainfall from the Gulf of Mexico and the Atlantic Ocean to Illinois and the Mississippi Valley.

Only a few small areas of Illinois have an elevation of more than 1,000 feet above the sea. The state is a plain with an average altitude of about 600 feet. The slight differences of elevation within the state have but little influence upon distribution of temperature or rainfall, and they permit easy movement of winds in all directions.

All parts of the state lie more than 500 miles from the Gulf of Mexico, more than 600 miles from the Atlantic, and more than 1,500 miles from the Pacific Ocean. The long distance to the Pacific and the high intervening mountains preclude the possibility of important influence of the western ocean on the climate of Illinois. The open plains to the Gulf and the moderate altitude of the Appalachians furnish free passage to Illinois of the moisture-bearing winds, which, under cyclonic influences, blow from the Gulf and the Atlantic, bringing the abundant and well-distributed rainfall which enables Illinois to rank as the first agricultural state in the Union.

The location of Illinois, therefore, determines that the weather and climate shall be of the continental type with



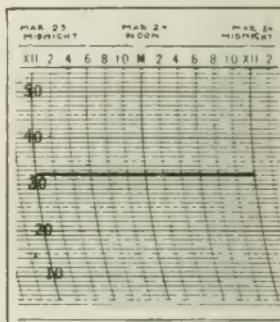
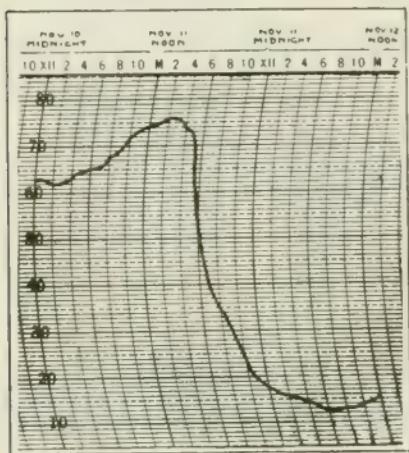
Paths of Highs in the United States. (After Van Cleef)



Paths of Lows in the United States. (After Van Cleef)

warm summers, cold winters, and a rainfall exceptionally well adapted to the development of agricultural pursuits.

Changeableness of Illinois weather.—In a region situated as Illinois is, weather changes are frequently rapid and occasionally excessive. The ordinary temperature changes controlled by solar influences whereby the heat of the day gradually increases until an hour or two after midday, and then gradually decreases during late afternoon and all night, may, under cyclonic influences, be greatly modified or entirely reversed. The following rapid changes in temperature took place at Chicago, but all parts of the state have similar experiences. On May 10, 1911, the temperature rose 27° F. in two hours; on



CHANGES IN TEMPERATURE

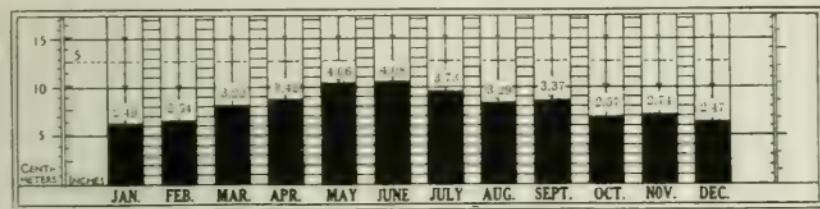
The thermograph records here shown indicate that a violent fall of temperature may take place during the hours of the day when temperature is normally rising, also that the temperature may remain stationary during an entire 24-hour period.

April 11, 1910, the temperature fell 28° F. in one hour; on March 29-30, 1895, the temperature rose 48° F. in a twenty-four-hour period; on November 11-12, 1911, the temperature fell 61° F. in a twenty-four-hour period. This rapid temperature change was general throughout the state. At some stations the fall was from 84° F. to 19° F., or 65° F. in an eighteen-hour period.

While this is the most remarkable change of temperature recorded by the Weather Bureau, more striking results occurred during a sudden drop in temperature on December 20, 1836, as shown by reports of citizens living at that time in central Illinois. Early in the day, with a temperature of about 40° F., a

rain had changed the snow on the ground to slush. Suddenly the temperature grew colder, and in a few minutes the slush became solid ice strong enough to bear the weight of a horse. Chickens were caught in the freezing slush and held fast. Ducks swimming on the pond had ice frozen to their feet and feathers. A man riding to Springfield on horseback through the rain was frozen to his saddle. Arriving at Springfield, he and his saddle were removed from the horse, carried into a warm room and thawed apart. In striking contrast to these unusual changes, the temperature at Chicago on March 24, 1891, remained all day at 32° F.

Winds may blow steadily from one direction for an entire day or for several days; they may change direction with such



AVERAGE MONTHLY PRECIPITATION OF STATE AS A WHOLE

The heavier rainfall of May, June, and July is favorable to growing crops, while the lighter rainfall of the later months is especially favorable for the threshing of the small grains and the ripening and gathering of corn.

rapidity that they blow from all quarters of the compass within a few hours; they may change velocity in a short time from a gentle breeze to a strong gale. While the average wind velocity at Chicago is 13 miles per hour, or 312 miles per day, on February 12, 1894, during a severe storm, the wind movement for the twenty-four hours was 1,347 miles, an average of 56 miles per hour. For a five-minute period the rate was 84 miles per hour, and the fastest mile was at the rate of 115 miles per hour.

The rainfall for each month in Illinois averages more than 2 inches and less than 5 inches, yet the monthly precipitation may vary from 0.00 as at Bushnell, McDonough County, and at Yorkville, Kendall County, in November, 1904, to 20.03 inches as at Monmouth, Warren County, in September, 1911.

The rainfall resulting from the passage of a single cyclonic disturbance may vary from a mere sprinkle to a heavy downpour of more than 8 inches, which resulted from the passage of the Galveston hurricane across the state August 17-18, 1915. Rain may fall so gently that dry ground is barely moist after an hour or more, or it may fall at the rate of 1 inch in 8 minutes as at Springfield on July 23, 1917. The former record was 1 inch in 12 minutes.

Unchangeableness of Illinois climate.—Since climate deals with *averages* of the various weather elements, sudden changes



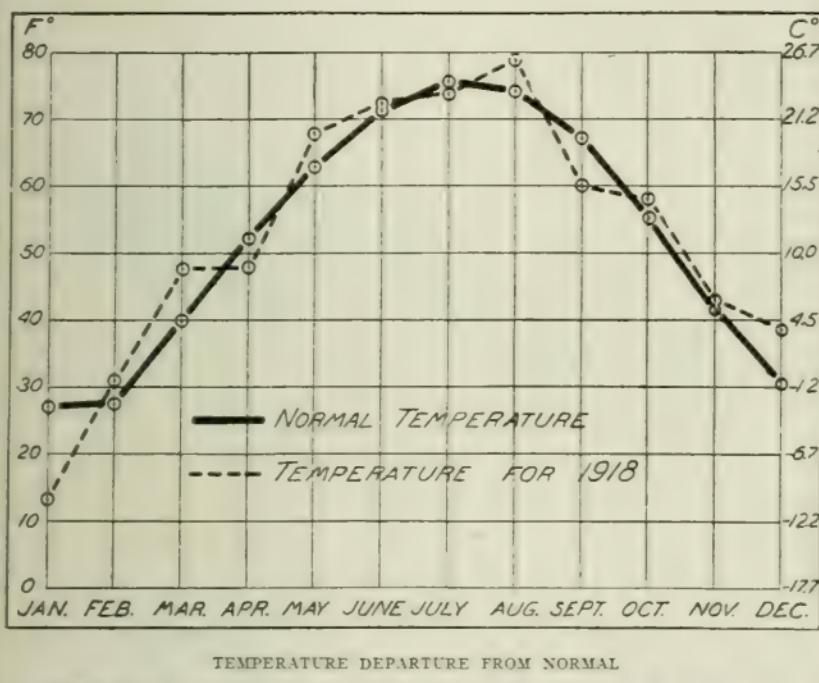
ICE IN OHIO RIVER AT CAIRO

In December, 1917, the coldest December for Illinois, the Ohio River could be crossed at Cairo on the ice for the first time in history. (Photograph by Florence Snyder.)

of temperature, unexpected shifting of wind direction, violent wind storms, unusual drought, or excessive rainfall may not modify to any appreciable extent the averages based on thousands of observations extending over periods of 20 to 40 years. Climatic maps thus take on a character of permanence while weather maps for a day, or a month, or a year may present a wide variation from the climatic conditions established on averages of 20 or more records of weather conditions at a station for a certain date, a certain month, or a certain year.

An average temperature established by observations over a long period of years is known as the *normal* temperature.

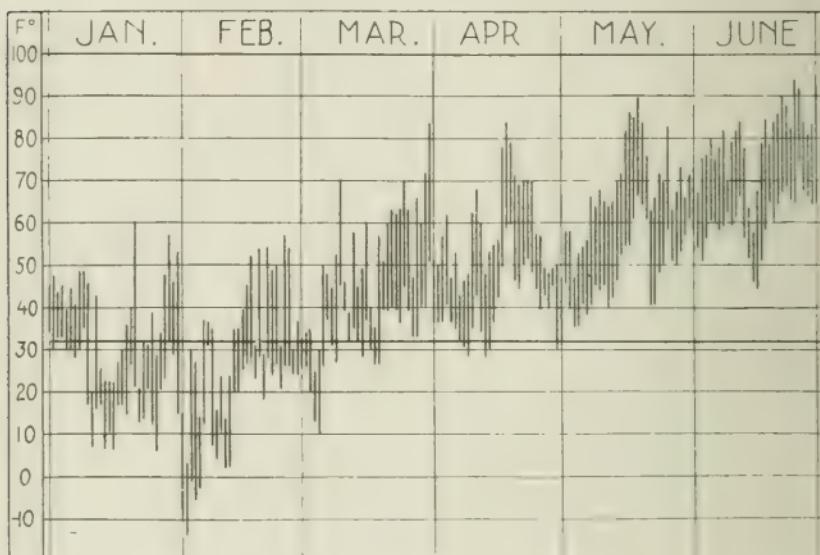
Even when marked departures from the normal occur, the excess is reduced to very slight changes on the average. Thus, while July, 1901, holds the record of the state as the hottest month with an average of 82.2° F., an excess of 6.3° above the normal for July, the average temperature of the year for



The normal temperature, determined from the averages of many years, is represented by a smooth curve, while the temperature of a single year may depart from the normal sufficiently to produce irregularities in the curve for that year.

the state was 0.1° below the normal for the state. While December, 1917, was 8.1° colder than the normal for December, the year 1917 was but 2.5° colder than the normal annual temperature. These departures, when combined with all previous records, change the averages only slightly. In fact, December, 1918, was 8.2° warmer than normal, thus offsetting completely in the average for December the unusually cold temperature of the previous December. While January, 1918,

holds the record of the state as the coldest month, with an average of 12.6° , or 14.3° colder than the normal for January, the average for 1918 was 0.5° warmer than normal. The normal annual rainfall of the state, 36.54 inches, would be changed only a fraction of an inch by the 47-inch rainfall of 1898, or by the 25-inch rainfall of 1901. In fact, when both these extremes of rainfall are used in the computation their influence on the average entirely disappears.



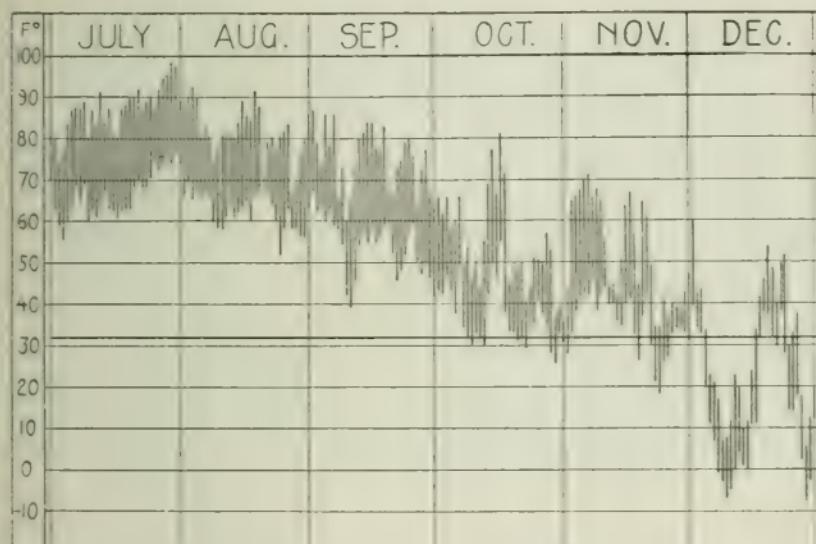
DAILY VARIATION IN TEMPERATURE JANUARY-JUNE, 1917

The 365 vertical lines of this graph with its continuation on page 73 show the daily range of temperature for every day during the year 1917.

This unchangeable character of the state's climate does not indicate uniformity of climate throughout the year. Illinois has a climate of the continental type and therefore experiences great seasonal changes of temperature with smaller seasonal variations in rainfall. The average temperature for the coldest month, January, is 26.9° , and that of the warmest month, July, 75.9° . December has the smallest average precipitation, 2.16 inches, and May has the largest, 4.07 inches.

Weather Bureau stations.—The United States Weather Bureau Service was established in 1870. It has been enlarged

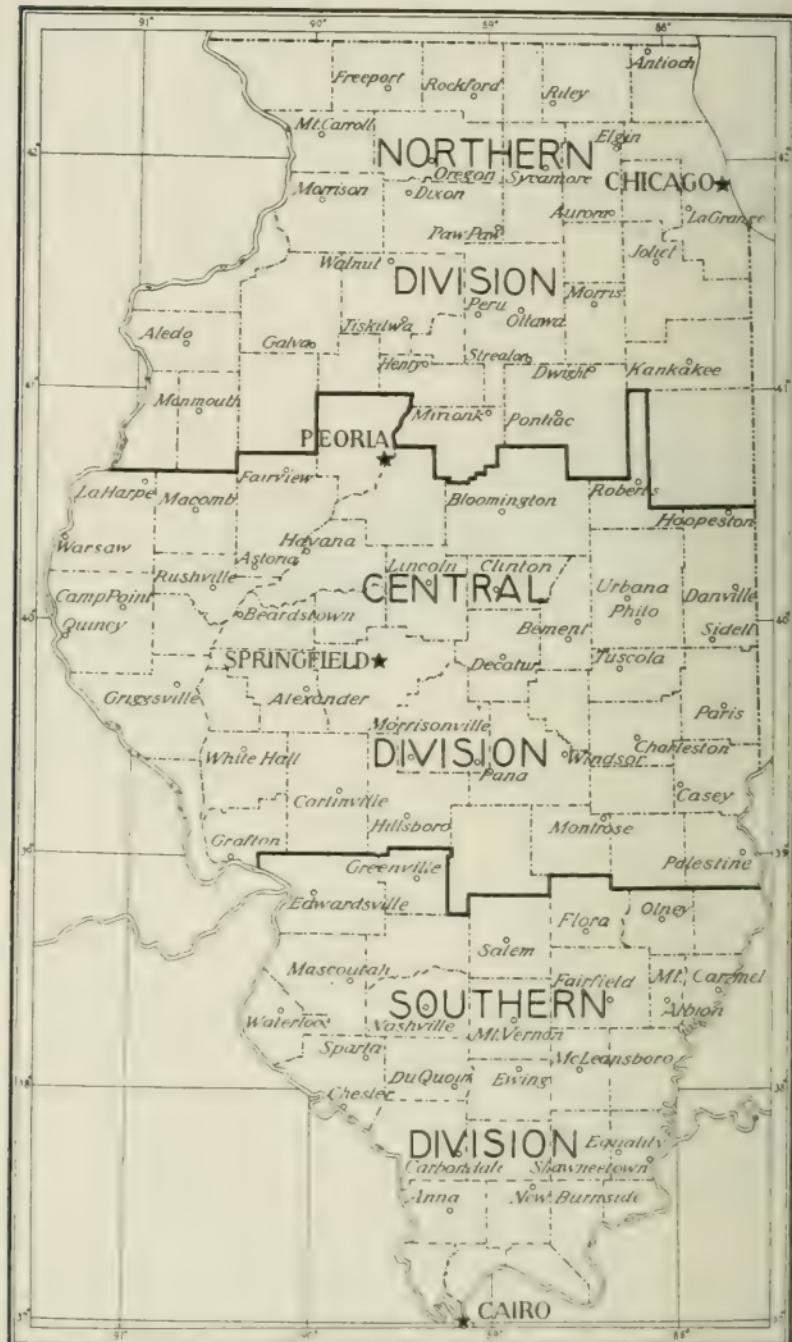
and extended until there are now 200 regular stations, fully equipped, and in charge of trained observers. Four of these stations are in Illinois. The one at Chicago is in the Federal Building; the one at Peoria is in the Weather Bureau Building on the campus of Bradley Polytechnic Institute; the one at Springfield is in the Weather Bureau Building at 107 Monroe Street; and the one at Cairo is in the Federal Building. Each of these stations is equipped with a full set of instruments for



DAILY VARIATION IN TEMPERATURE JULY-DECEMBER, 1917

measuring temperature; pressure; direction and velocity of wind; rainfall; snowfall; humidity; sunshine and cloudiness.

The Chicago station issues district forecasts for Illinois, Wisconsin, and states west to Montana. It has charge of the storm-warning equipment for a part of Lake Michigan. It is the central office for the corn and wheat regions of the country. The Springfield station is the section center for the state. It receives reports from the co-operative observers and issues monthly and annual reports for the state. It also receives reports from a large number of crop correspondents throughout the state and issues a weekly report of Illinois crop conditions



WEATHER BUREAU STATIONS OF ILLINOIS

during the crop-growing season. The Peoria and Cairo stations maintain river gauges. The Cairo office also has charge of the river stations on the Ohio from Cairo to the mouth of the Wabash, and on the Tennessee and Cumberland rivers throughout their courses.

In addition to the fully equipped stations, the government has established about 4,500 co-operative stations, about 70 of which are in Illinois. The location of the Weather Bureau

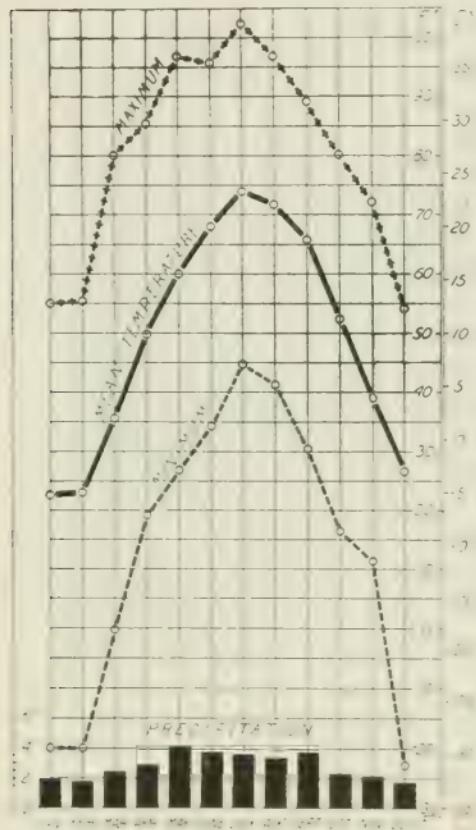


INSTRUMENT SHELTER AND RAIN GAUGE, PONTIAC, LIVINGSTON COUNTY

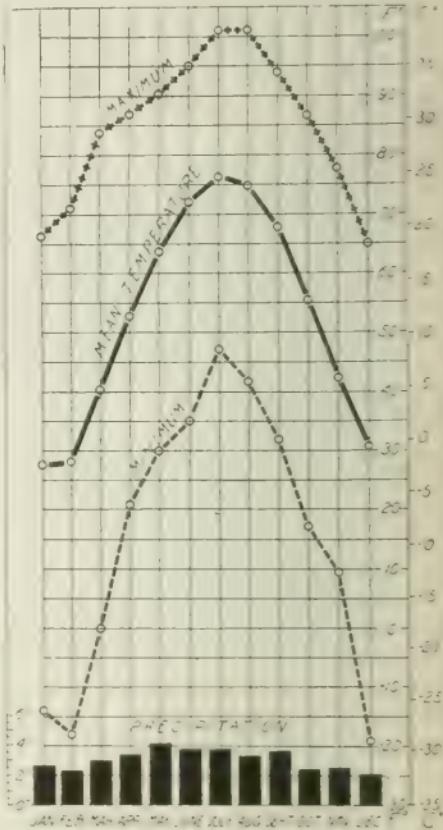
The shelter in the foreground contains the maximum and minimum thermometers. At the right of the center is the cylindrical rain gauge. Instruments are read and results recorded daily. At the end of the month reports are sent to the section center at Springfield.

stations of Illinois is indicated on the foregoing map. Each co-operative station has a rain gauge and a thermometer shelter with maximum and minimum thermometers. Observations are made and recorded daily by co-operative observers. At the end of the month the records of both the regular and the co-operative stations are sent to the section director at Springfield. From these he compiles and publishes a monthly report giving in detail the records of the various stations accompanied by a general description and summary of the weather of the month. Early in the year the section

director issues an annual summary for the preceding year. The facts of greatest general interest concerning monthly and annual weather conditions are widely published by the newspapers.



WEATHER CONDITIONS IN NORTHERN DIVISION



WEATHER CONDITIONS IN CENTRAL DIVISION

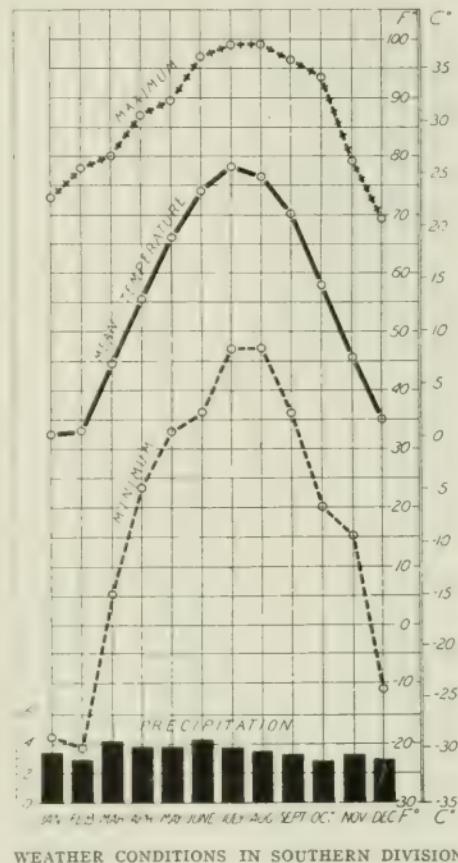
These two graphs and the one on page 77 make possible a comparison of the weather conditions of the three divisions of the state. Differences in latitude are the most important single factor influencing differences in weather and climate.

Weather records.—For climatological data the Weather Bureau has divided Illinois into three divisions along county lines. The northern division lies between the Illinois-Wisconsin boundary and the county lines near the forty-first parallel; the central division extends southward to the county lines

near the thirty-ninth parallel; the southern division includes the rest of the state.

It is impossible to give here the climatological data for all the stations. Selection has therefore been necessary. Of the 15 stations chosen, 5 are in each division. These are well distributed over the state and within the divisions. Only small sections of the state are more than 50 miles from one of these selected stations. The climatological data, therefore, for any point within the state will be very nearly the same as that of the nearest station given in the tables. The stations are arranged in order of latitude from north to south. For convenience in computing the north-south distances between stations, one minute of latitude may be given the value of one mile, although it is somewhat more than a mile in length. While latitude is the chief factor in determining differences in temperature; and distance from the Gulf of Mexico and the Atlantic Ocean the principal factor in determining differences in rainfall in Illinois; yet other factors, such as altitude, topography, and the presence of water bodies, have their influences, which may modify slightly the results expected from the main factors alone.

Table I, which deals with temperature, shows many interesting facts, but, owing to the limited number of places,



WEATHER CONDITIONS IN SOUTHERN DIVISION

not all extremes are shown. Sycamore in DeKalb County has the lowest annual temperature in the state, 47.1° , and Cairo the highest, 57.6° , giving a difference of 10.5° . This is at the rate of 1° to 33 miles, or about 2° of temperature to 1° of latitude. In July, however, the differences are less, and in January more, than for the year. In July the lowest temperature, 71.8° , is at Riley in McHenry County, and the

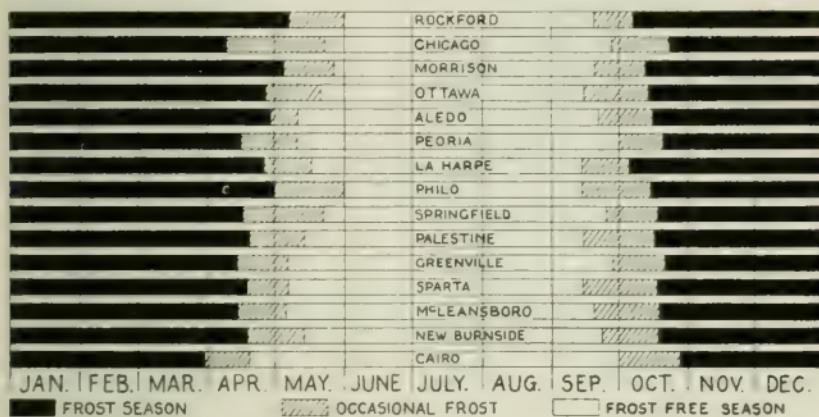
TABLE I
TEMPERATURES FOR SELECTED STATIONS

STATIONS	LATITUDE	NORMAL TEMPERATURES			EXTREME TEMPERATURES		
		Annual	July	January	Highest	Lowest	Range
Rockford.....	$42^{\circ}16'$	48.2	73.9	21.0	110	-26	136
Chicago.....	$41^{\circ}53'$	48.5	72.4	23.7	103	-23	126
Morrison.....	$41^{\circ}49'$	48.5	73.6	21.2	111	-30	141
Ottawa.....	$41^{\circ}21'$	50.4	75.5	24.1	112	-26	138
Aledo.....	$41^{\circ}13'$	50.0	74.9	23.7	108	-30	138
Peoria.....	$40^{\circ}42'$	49.9	75.4	23.1	106	-27	133
La Harpe.....	$40^{\circ}35'$	51.2	76.4	24.1	108	-30	138
Philo.....	$40^{\circ}00'$	51.0	74.7	26.0	105	-26	131
Springfield.....	$39^{\circ}48'$	52.2	76.5	26.3	107	-24	131
Palestine.....	$39^{\circ}00'$	53.8	76.7	29.5	105	-21	126
Greenville.....	$38^{\circ}53'$	54.2	77.7	29.4	113	-21	134
Sparta.....	$38^{\circ}7'$	55.7	77.7	32.6	111	-23	134
McLeansboro.....	$38^{\circ}3'$	55.6	77.9	31.8	110	-19	129
New Burnside.....	$37^{\circ}35'$	55.3	76.7	33.0	112	-26	138
Cairo.....	$37^{\circ}00'$	57.6	78.6	34.8	106	-16	122
State averages for all stations.....		52.0	75.4	26.9	115	-32	147

All temperature readings are given in Fahrenheit degrees.

highest, 79.7° , at Carbondale in Jackson County. This gives a difference of 7.9° among the stations of the state. In January, the lowest temperature, 17.9° , is at Freeport in Stephenson County, and the highest, 35.8° , at Equality in Gallatin County, giving a difference of 17.9° , or $2\frac{1}{4}$ times as great as for July. All parts of the state have experienced temperatures above 100° and below -15° . The coldest temperature on record for the state, -32° , occurred in Ashton,

Lee County, February 13, 1905, the hottest, 115° , at Centralia, in Marion County, July 22, 1901. The extreme range for Illinois is thus 147° . The temperature range for the United States is 184° , and for the world 217° .



FROST SEASONS FOR SELECTED STATIONS

June, July, and August are the only frost-free months for all parts of the state. Occasional frost occurs in May and September for all parts of the state except the extreme southern portion.

TABLE II

STATIONS	AVERAGE DATE OF		AVERAGE NUMBER OF DAYS WITHOUT FROST	DATE OF	
	Last Killing Frost in Spring	First Killing Frost in Autumn		Latest Killing Frost in Spring	Earliest Killing Frost in Autumn
Rockford.....	May 7	Oct. 6	160	May 31	Sept. 18
Chicago.....	Apr. 9	Oct. 22	182	May 23	Sept. 27
Morrison.....	May 4	Oct. 10	161	May 27	Sept. 19
Ottawa.....	Apr. 26	Oct. 12	168	May 21	Sept. 19
Aledo.....	Apr. 29	Oct. 14	168	May 11	Sept. 26
Peoria.....	Apr. 15	Oct. 18	186	May 11	Sept. 30
La Harpe.....	Apr. 25	Oct. 4	162	May 16	Sept. 13
Philo.....	Apr. 30	Oct. 12	154	May 31	Sept. 13
Springfield.....	Apr. 16	Oct. 17	184	May 22	Sept. 25
Palestine.....	Apr. 19	Oct. 15	179	May 14	Sept. 19
Greenville.....	Apr. 14	Oct. 20	189	May 6	Sept. 29
Sparta.....	Apr. 18	Oct. 16	170	May 7	Sept. 14
McLeansboro.....	Apr. 14	Oct. 17	186	May 5	Sept. 19
New Burnside.....	Apr. 19	Oct. 16	180	May 14	Sept. 23
Cairo.....	Mar. 29	Oct. 27	211	Apr. 19	Sept. 30

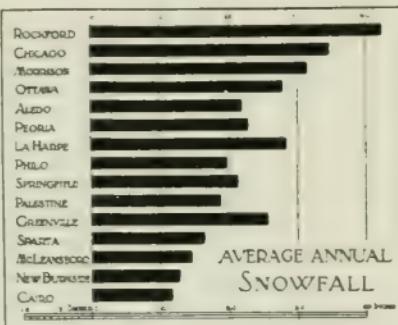
Table II, which records frost data, indicates the average length of the frost-free season or the "growing season" at the various stations. It also shows the extent to which this period has been shortened at times in the spring and in the fall. The growing season of the state varies from 5 months in the north to 7 months in the south. The longer growing period of southern Illinois and the somewhat less severe winter temperatures give more favorable conditions for fruit growing than are found in the northern part of the state. It also makes possible the successful cultivation of cotton in the lowlands of the extreme southern part of the state.

TABLE III
AVERAGE PRECIPITATION, IN INCHES, FOR SELECTED STATIONS

STATIONS	ANNUAL RAINFALL					WINTER	GROWING SEASON		ANNUAL SNOWFALL
		SPRING	SUMMER	FALL			APRIL-SEP-TEMBER	PERCENTAGE OF ANNUAL	
Rockford.....	35.80	9.76	11.32	8.30	6.42	21.81	61	42.2	
Chicago.....	33.28	8.80	10.18	8.07	6.23	19.45	58	34.6	
Morrison.....	34.92	10.41	11.94	7.73	4.84	23.37	67	31.5	
Ottawa.....	34.08	9.80	10.38	7.88	6.02	20.98	61	27.9	
Aledo.....	31.49	9.00	9.65	8.48	4.36	20.92	66	21.9	
Peoria.....	36.29	10.50	10.20	8.33	7.26	20.86	57	22.5	
La Harpe.....	37.78	10.56	12.23	8.60	6.39	24.22	64	28.1	
Philo.....	35.74	10.37	10.38	8.10	6.89	20.51	57	19.8	
Springfield.....	36.96	10.87	10.01	8.63	7.45	21.18	57	21.4	
Palestine.....	40.84	11.09	11.32	9.32	9.11	21.69	53	18.9	
Greenville.....	42.13	11.96	11.72	9.70	8.75	23.75	56	25.6	
Sparta.....	39.84	11.48	10.77	9.34	8.25	21.87	55	16.2	
McLeansboro.....	40.57	11.43	10.73	8.69	9.72	21.21	52	14.6	
New Burnside.....	42.45	12.03	10.78	9.41	10.23	21.64	51	12.9	
Cairo.....	41.70	11.42	10.69	9.12	10.48	20.56	49	11.7	
State averages for all sta- tions	36.54	10.33	10.76	8.47	6.98	21.65	59	24.6	

Table III, which records precipitation, shows the normal annual rainfall and the amount received in each of the four seasons, also the amount falling during the six months, April

to September, inclusive—the half of the year during which crops make practically all their growth. In recording snowfall as a part of the precipitation, the observer makes three records; one indicates the depth of newly fallen snow on the level; another, the depth of snow including previous snowfalls; and the other, the amount of water obtained by melting the snow which fell during the past 24 hours. This latter result is added to the rainfall of the month, and thus snowfall finds its way into the precipitation records as rain. The table shows clearly the influences of latitude on the amount of snowfall received.



AVERAGE ANNUAL SNOWFALL

In general, the snowfall increases rapidly with latitude or distance from the equator. Snow is melted and reported as a part of the rainfall. About 10 or 12 inches of snow are equal to 1 inch of rainfall.

The annual-rainfall map shows that the normal annual rainfall of Illinois is not as regularly distributed as the normal annual temperature. There is, however, a similar change as the state is crossed from north to south. The least normal annual rainfall reported by any station is 31.28 inches at Elgin in Kane County;

The heaviest is 47.44 inches among the Ozark Hills at Anna in Union County, making a difference of 16.16 inches.



VEGETATION WEIGHED DOWN WITH WINTER SNOW AT CORNELL, LIVINGSTON COUNTY

Damp, clinging snow, falling without strong winds, covers bushes and trees with a mantle of white. (Photograph by Mabel Jones.)

The normal annual rainfall for the state, 36.54 inches, with its seasonal distribution, is exceptionally favorable for the

production of maximum crops. If the *average* rainfall were the *actual* rainfall year by year, season by season, and month by month, there would be no crop failures of any kind; there would be neither swollen streams nor flooded farm lands; the larger precipitation of spring and summer would always suffice for the rapid growth of all crops; and the smaller rainfall of autumn

and winter would give the best of weather for harvesting and threshing small grains, and for the ripening and gathering of corn.

The normal temperatures of the state and the average length of the growing season are also favorable for the production of large yields of staple farm crops. It is because the normal or *average* climatic conditions of Illinois are especially satisfactory that the state can undergo marked variations from average conditions without disastrous results.

The rainfall of a single year.—A study of the climatic factors of a single year shows that weather conditions may vary widely from the climatic averages. The abundant crops of 1915 were produced with an annual rainfall for the state of 41.90



NORMAL PRECIPITATION

Normal precipitation, like normal temperature, decreases from south to north, but somewhat less regularly than normal temperature.

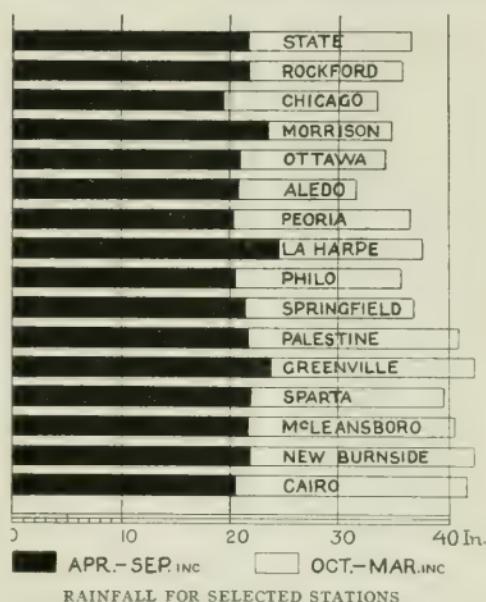
inches, an excess of 4.77 inches. The variations among stations were from 29.46 inches at Joliet, where the deficiency for the year was 3.33 inches, to 59.16 inches at Chester, Randolph County, where the excess was 16.21 inches. The difference between the two stations for this year was 29.70 inches, while the greatest difference between the normal annual rain-

fall for any two stations is 16.16 inches, and the difference between the six northernmost and the seven southernmost counties is 10.55 inches. During 1915 the variation in rainfall by months was from only a *trace* at Fairfield, Wayne County, in April, to 14.77 inches at Griggsville, Pike County, in June. There was a deficiency of rainfall in the months of February, March, April, October, and November amounting to 6.45 inches. The excess of 11.22 inches during the other seven months was sufficient to equal the deficiency of these five months and to add an excess of 4.77 inches for the year.

The table of state averages (Table IV) shows how the precipitation of 1915 varied from the normal by months.

TABLE IV

EXCESS OF PRECIPITATION		DEFICIENCY OF PRECIPITATION	
Month	Inches	Month	Inches
January.....	.23	February.....	.34
May.....	2.81	March.....	2.15
June.....	.73	April.....	1.99
July.....	3.15	October.....	1.69
August.....	2.84	November.....	.28
September.....	.81		
December.....	.65		
Excess of 7 months..	11.22	Deficiency of 5 months..	6.45
Excess of year.....	4.77		



RAINFALL FOR SELECTED STATIONS

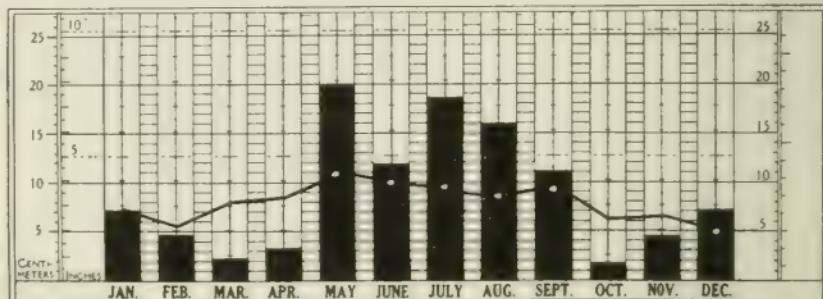
In general, the annual rainfall decreases with distance from the Gulf of Mexico and the Atlantic Ocean. Less variation in amount of rainfall occurs in the summer half of the year than in the winter half.

The following is from the annual summary of weather conditions for Illinois in 1915, published by the Weather Bureau:

The year opened with a rather cold month and some extremely low temperatures, but February was almost springlike and there was very little snow. The early spring was dry, with warm sunny weather in April. Crops were planted in good season. A period of cool, cloudy, and wet weather began in May and continued through August, and the summer was the coldest and rainiest in the meteorological history of the state. Destructive local storms were frequent, and much land was inundated. Corn was damaged and its growth retarded, and threshing operations were greatly delayed. The autumn was favorable for farm work, especially in October when the weather was clear and dry. Killing frost injured late corn in the more northern counties. Field work ended December 10 and considerable snow fell after the twenty-third.

The mean temperature was practically normal, but the highest, 101, has been equalled or exceeded in every previous year. Lower minimum temperatures occurred in 1905, 1910, and 1912. There have been but two wetter years since 1884, the number of cloudy days was exceeded only in 1898. The precipitation was above normal at nearly all stations; and in several counties the excess was more than 10 inches.

The heavy but fairly well-distributed rains of May and June, accompanied by moderate temperatures, induced a remarkably



RAINFALL OF THE STATE, 1915

Although the precipitation of 1915 was below normal for five months, the excessive rainfall of other months made the summer season very wet.

vigorous growth of vegetation; and wheat, oats, and corn developed rapidly. The continuance of excessive rains through July and August made the harvesting and threshing of wheat and oats very difficult. Even with these handicaps of weather a most satisfactory yield was procured and marketed.

The excess of rainfall for August was due almost wholly to the passage of the Galveston hurricane diagonally across the state from southwest to northeast, August 17-18, with exceed-

ingly heavy rainfall, some points reporting more than 8 inches. This excessive rainfall and the high winds accompanying it laid the ripening corn over vast areas flat on the muddy ground. The moderate rainfall of September, however, followed by a clear and dry October and November, permitted the successful ripening and harvesting of an abundant corn crop.

The heavy rains of the year and their peculiar distribution in some localities were so far removed from the ordinary as to make perceptible changes in the annual-rainfall map of the state when the 1915 reports were averaged with all preceding records.

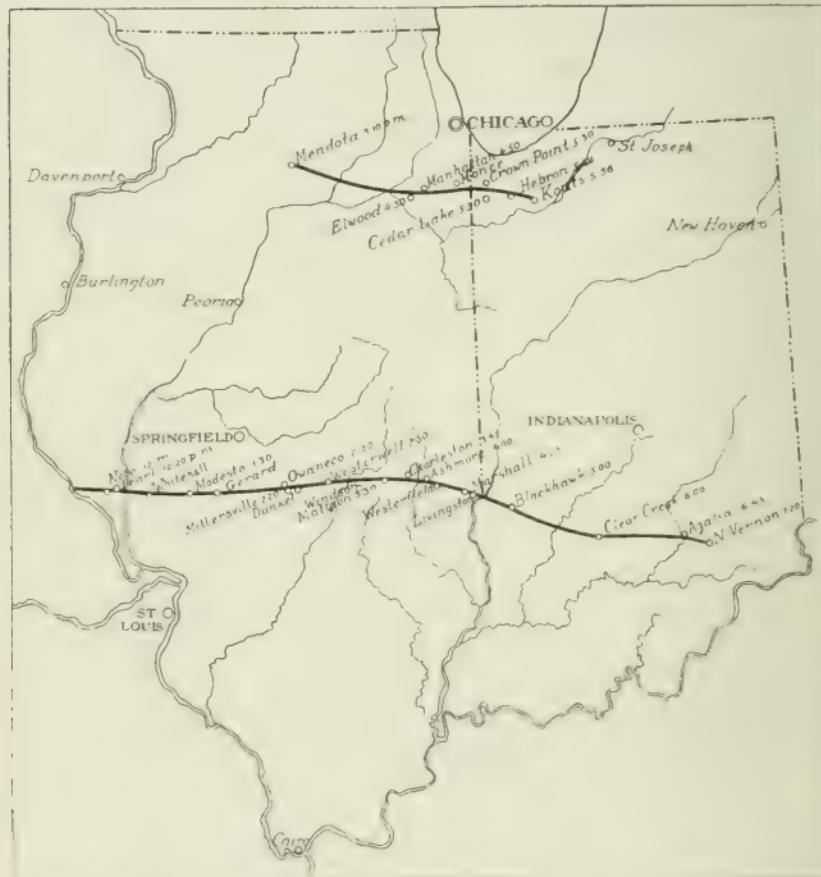
Tornadoes.—Many tornadoes have occurred in Illinois, and have done great damage over small areas. The tornado is a small, violent, whirling storm, which sometimes develops in the southeast quadrant of a cyclone, or low-pressure area, during the spring and summer months. It is almost always less than a mile, often only a few hundred feet, in width. Its course is easterly and the path is usually 20 or 30 miles in length. Tornadoes are more common in the Mississippi Basin than elsewhere in the world. The St. Louis tornado of May 27, 1896, caused its greatest destruction in the city of St. Louis, but the storm crossed the Mississippi River and did much damage in Illinois. No means has been found for forecasting the time or place of occurrence of a tornado. In the open country a person may observe the narrow, funnel-shaped cloud approaching and run out of its path so as to escape its violence. It is better to run to the north of the center of the path as the winds are less violent on the north than on the south side of the tornado.

On May 26, 1917, Illinois and Indiana experienced two of the most remarkable tornadoes in the history of the Weather Bureau observations. These storms are fully described in the Weather Bureau reports for May, 1917. Only a brief summary can be given here:

The northern storm was first seen at Mendota, La Salle County, Illinois, at 3:10 P.M. of the twenty-sixth. It reached Kouts, Porter County, Indiana, at 5:56 P.M., thus traversing a distance of 110 miles in 2 hours and 46 minutes, or at an average velocity of translation of 40 miles per hour. The path varied greatly, being as wide as 3 miles in places, but the worst effects were noted in a track about one-half mile in width. Intense darkness was reported by those directly in the path of the storm, and heavy rain and hail fell, some hailstones being as large as hens' eggs. The co-operative observer at Joliet measured a hailstone 1.25 inches by 3.92 inches. The loss to

property in Illinois was at least \$750,000. The property loss in Porter County, Indiana, was estimated at \$500,000. Hailstones from 6 to 10 inches in circumference and a half pound in weight fell thickly in Indiana.

The central tornado was remarkable, not only on account of its severity, but because of its great length. The tornado cloud was first seen at Pleasant Hill, Pike County, at noon on the twenty-sixth. From this point it moved



PATHS OF TORNADOES

This map shows the path and time of arrival at various stations for two tornadoes of May 26, 1917. The average rate of travel was 40 miles per hour for each tornado.

due east in a remarkably straight line to Charleston: then bore southeastward across three-fourths of Indiana, terminating near North Vernon, Indiana, at 7:20 p.m. It covered 188 miles in Illinois and 105 miles in Indiana, or a total length of path of 293 miles in 7 hours and 20 minutes, or at an average velocity of translation of 40 miles per hour. This is the exact velocity of the northern storm. The effects of the tornado were felt

over a path more than one-half mile wide, but the path of serious damage was generally about one-fourth mile in width. The storm seemed to lift at times, causing little harm at some places in its path, but inflicting great destruction at others.

Mattoon and Charleston were the largest cities in the direct path of the storm, and great destruction was wrought. This storm crossed the entire state of Illinois, and caused within the state the loss of 101 lives, injury to 638 persons, and a property loss estimated at \$2,500,000.

In the late afternoon of May 27, tornadic storms occurred in southwestern Illinois with a property loss estimated at \$200,000.

The Weather Bureau report for Illinois gives detailed information concerning the tornadoes of March, 1920:

Local tornadic storms occurred in Logan County on the twenty-fifth and in the northeastern part of the state on the twenty-eighth. The Logan County tornado occurred between 5:00 P.M. and 5:30 P.M. Its path was about 20 miles long. It seemed to rise when it reached the west boundary of Lincoln and at other places in its path, leaving some stretches unharmed. The property loss is estimated at \$15,000.

Three distinct tornadoes occurred in northeastern Illinois between noon and 1:00 P.M. (Central Standard Time) on Sunday, March 28. There were 28 known deaths, 300 persons were injured, and the property losses amounted to over \$3,000,000.

The Elgin tornado apparently had its inception in Kane County, about $3\frac{1}{2}$ miles southwest of Geneva at about 12:05 P.M. It reached Elgin, 15 miles from its point of inception, at 12:23 P.M., or at an average velocity of translation of 50 miles an hour. The total length of its path was approximately 30 miles and its width varied from 300 yards to about one-half mile.

The Melrose Park-Wilmette tornado originated about 12:15 P.M. in Will County, about 8 miles southwest of Joliet. Great destruction was wrought about 3 miles west and northwest of Joliet. The tornado cloud lifted when about $2\frac{1}{2}$ miles northwest of Lockport and it dipped only occasionally as it neared the Des Plaines River. Only minor damage was done until the tornado reached Bellwood, Maywood, and Melrose Park. The greatest devastation was experienced in Melrose Park at 12:55 P.M. The tornado cut a path northeastward across the village about 100 yards wide. The tornado continued to move directly northeastward, passing through the northwestern part of Evanston, and across Wilmette to Lake Michigan, which it reached about 1:15 P.M., just one hour after its inception in Will County, 50 miles to the southwest.

The Clearing tornado, 10 miles in length, occurred in the central part of Cook County between 1:00 P.M. and 1:15 P.M. The damage wrought was slight in comparison with the other two tornadoes.

Sleet, hail, and ice storms.—Precipitation sometimes falls in winter in the form of small, clear pellets of ice consisting of frozen raindrops known as sleet. Sleet is also called "winter hail." Small, white pellets of compacted snow occasionally fall in spring or late autumn. This is sometimes called "soft hail," but the Weather Bureau reports it only as snow.

Hail sometimes falls during a thunderstorm. It accompanies thunderstorms in the hottest part of the year and the hottest part of the day. The area receiving hail is smaller than the area of the accompanying thunderstorm. A large hailstorm may be 6 to 7 miles wide and 40 to 50 miles long. Hailstones vary in size up to several inches in diameter. Doubtless hail has fallen in every part of Illinois. In some instances



ICE WEIGHING DOWN TREES AT WAVERLY, MORGAN COUNTY

Vegetation and other exposed objects may be below freezing-point while rain is falling. The rain is changed to ice on these cold surfaces. Branches of trees and bushes and telephone and telegraph wires are heavily loaded, sometimes broken, by the weight of the ice. (Photograph by A. H. Moffett.)

the destruction caused has been very great. Cornstalks have been stripped of their leaves and the crop practically ruined. Windows of houses have been broken, and the glass coverings of greenhouses have been shattered. In some cases animals have been killed.

The Weather Bureau report of June, 1915, gives an account of a destructive hailstorm which occurred during the night of June 20-21. The hailstorm crossed the state in a southeasterly

direction from Calhoun County, where it appeared at 8.30 p.m., to Wabash County, where it passed into Indiana about midnight.

Buildings and trees were destroyed, wire service crippled, trains delayed, one person injured, large quantities of plate glass in store windows and glass in greenhouses broken by hail; timothy, oats, corn, and wheat laid flat by the wind and torn into shreds by the hail, causing a loss to crops alone of thousands of dollars. White County reports the total damage to buildings and crops as approximately \$100,000. Carrollton, Greene County, reports an estimated loss in that immediate vicinity of more than \$100,000. The hail killed 50 shoats on a farm near Carrollton. Reports stated also that some sheep and cows were killed by the hail.

As in the case of a tornado, no forecast can be made of the approaching hailstorm.

An ice storm occurs when rain falls on surfaces cold enough to freeze the rain. These are often called "sleet storms," but the Weather Bureau uses the term *sleet* only for precipitation which falls in the form of frozen raindrops, and thus reaches the ground. An ice storm may occur when weather colder than freezing is followed by rain, and the rain is then frozen to the cold surfaces. Or, the ice storm may come during the latter part of a long-continued rainstorm with the temperature falling so rapidly that exposed surfaces, such as poles, wires, trees, shrubs, grass blades, stubble, and weeds radiate their heat so rapidly that they reach freezing temperature an hour or two before the ground or water freezes, and before the rain ceases or turns into snow.

On January 30, 1916, an ice storm prevailed over portions of Illinois. The writer traveled across the area of ice formation from East St. Louis to Springfield. A heavy rain had been falling for several hours. The temperature began to fall. At 8:00 a.m., when the train left East St. Louis, a thin coating of ice was forming on the trees and shrubs. Soon the ice was observed on the telegraph and telephone wires. Trees, weeds, and wheat plants were incrusted in ice. The wet ground and pools of water were not yet frozen, but plants projecting above the water were completely covered with ice. By 9:30 the rain had ceased. Slender twigs and their incrustations were from three to six times the diameter of the twigs alone. Wires were loaded with a thick coat of solid ice and with innumerable icicles 3 or 4 inches in length. Strong poles carrying as many

as fifty wires were brought to the ground. For several miles, in the center of the ice storm, telegraph and telephone poles were down or leaning heavily. Railroad switching devices were so thickly ice-covered that they were operated with great difficulty. The heaviest ice observed was from Godfrey in Madison County



RUINS AFTER TORNADO AT MELROSE PARK, COOK COUNTY

Results of the tornado of March 28, 1920. The path of the tornado in this part of its course was about 100 yards in width. (Photograph by Eugene J. Hall.)

to Brighton in Macoupin County, but the ice storm was severe along the route of the journey from East St. Louis to Springfield. North of Springfield the ice formations grew rapidly less in amount, and no indications of an ice storm were found at Bloomington.

An ideal climate.—Whether a climate is ideal or not depends on what we mean by "ideal."

For rest and recreation a warm equable climate is doubtless most delightful; for a fishing or climbing trip something quite different is desirable. For most people the really essential thing in life is the ordinary work of

every day. Hence, the climate which is best for work may, in the long run, claim to be the most ideal. At least it is the one which people will ultimately choose in the largest numbers.¹

A progressive people as measured by modern standards cannot develop in the warm equable climate of the tropics, nor in the rigorous cold of the polar regions. Human progress has been achieved most largely in middle latitudes where climatic conditions permit and require careful and systematic tilling of the soil during the growing season of summer to provide food and clothing sufficient for the entire year, which includes the long, unproductive season of winter. Within this temperate belt, energetic and progressive nations have occupied with large populations all those regions having favorable climatic conditions.

Illinois lies in the midst of one of the most extensive of these favored lands. The warm growing season of 5 to 7 months gives opportunity to mature the great staple food crops year after year without extensive frost damage.

The normal annual rainfall with proper distribution during the growing and ripening seasons is favorable for the production of maximum crops. The constant winds of moderate velocity carry moisture and give an invigorating atmosphere. The daily and seasonal changes of weather stimulate human activity in all lines of endeavor. Human energy and human progress are greatest in those regions of the earth where there are striking but not extreme differences between winter and summer; where weather changes from day to day are marked, but not violent; where stormy weather comes at frequent intervals, alternating with clear, dry weather. Judged by these standards Illinois stands second to none in her invigorating "ideal climate."



ROOK'S CREEK, LIVINGSTON COUNTY

A typical winter scene, showing the open forest commonly found along streams in the prairie lands of Illinois. (Photograph by Mabel Jones.)

¹ Ellsworth Huntington, *Civilization and Climate*.

CHAPTER VI

NATIVE VEGETATION

Vegetation areas.—The land surfaces of the earth may be classified on the basis of native vegetation into three regions:

forests, grasslands, and deserts. The fertile soil and the favorable climate of Illinois preclude any possibility of desert areas within the state. Abundant plant growth in natural forests and natural grasslands, or prairies, covered the entire state. In southern Illinois native vegetation consisted of large tracts of mixed hardwood forests, interspersed with small prairies; in central and northern Illinois extensive areas of prairie lands prevailed with long tongues of forest extending from the wooded belt of the south along the principal watercourses and their tributaries, thus dividing the prairies into irregular areas in the inter-stream spaces.



VEGETATION MAP OF ILLINOIS

This map shows by the shaded portions the extent to which the Prairie State was occupied by natural forests. The unshaded portion represents the original open prairies.

These wide areas of grasslands were new to the explorers and pioneers who had come from the East where the entire

country had originally been covered by a heavy growth of timber. Small prairies were found in portions of Ohio and Indiana, but not until the Illinois country was reached did prairies become characteristic of large regions. The name "Prairie State" was given to Illinois, although other states farther west, and settled later, have a larger proportion of prairies than Illinois.



LUXURIANT VINE AND TREE GROWTH IN FORMER VIRGIN FOREST OF THE LOWER
WABASH NEAR MOUNT CARMEL

(Copyright by Robert Ridgway)

The forests.—The forests of Illinois are but a portion of that great forest area which, in its original extent, stretched along the entire Atlantic Coast, thence westward beyond the Mississippi into Texas, Arkansas, and Missouri, and to the prairies of Illinois and southern Wisconsin. These Illinois forests were of supreme importance to the pioneer. They furnished all necessary building materials for his house, barn, and other



ROCKS COVERED WITH FERNS AND LICHENS, JOHNSON COUNTY, NEAR TUNNEL HILL

At places among the Illinois Ozarks the precipitous cliffs support only a scant vegetation. (Copyright by Robert Ridgway.)



SQUARED WHITE-OAK TIMBER BEING SHIPPED FROM MOUNT CARMEL TO ENGLAND FOR CONSTRUCTION OF BRITISH NAVY

The forests of southern Illinois have produced large quantities of excellent timber. This photograph was taken many years ago. (Copyright by Robert Ridgway.)

structures; rails for his fences; fuel for his home; protection from the storms; and a building site near a supply of water for domestic use.

We of today are prone to pass criticism on the pioneer for lack of foresight in crossing prairie land, now valued at more than \$300 per acre, to settle in a forested area with a present value of less than one-third that of the prairie. Yet it is possible that, with our present knowledge of relative values, we would do as the pioneer did if we were to enter a similar area with his equipment and the necessity of supplying ourselves with all the necessities of life from our immediate environment. The difficulties presented by the open prairies for constructing houses, barns, and field inclosures; for obtaining water for man and beast; for securing a fuel supply; and for protection from strong winds were too great to compensate for possible increases in land values during the next fifty years, even if such land values had been suspected. Thus the Illinois forests along the Wabash, Ohio, Mississippi, and Illinois rivers became naturally and necessarily the sites of the earlier settlements of the state.

Sawmills in the forests were among the earliest manufacturing plants of the state. A number of well-equipped sawmills are today doing an important business among the forests of southern Illinois. Forests in the Cache Valley are now being



ISOLATED ROCK IN WOODS NEAR TUNNEL HILL, JOHNSON COUNTY

Land as rugged as that shown in this view is necessarily left in its natural condition



NATIVE ILLINOIS FOREST NEAR MOUNT CARMEL, WABASH COUNTY

The flood plain of the Wabash River Valley originally supported a dense growth of native forest trees. (Copyright by Robert Ridgway.)

cut over for the third time. The first cutting of more than thirty years ago included the larger trees, many of which were cypress. The second cutting of about twenty years ago included smaller trees than the first cutting, but many of these had made considerable growth in the years intervening. More money, but probably not more lumber, was realized from the second cutting than from the first. The third cutting, now in



STEEL BRIDGE ON CAIRO DIVISION OF "BIG FOUR" RAILROAD AT GLEN FERN,
JOHNSON COUNTY

The forested areas of the Illinois Ozarks are still extensive, especially where the rugged topography is not favorable for agriculture. (Copyright by Robert Ridgway.)

progress, promises to yield a larger return in money, but not in lumber, than either of the previous cuttings.

Extensive forests are still to be found in southern Illinois, especially in those portions of the broad flood plains which are too swampy to be easily drained for agricultural purposes, and among the Ozark Hills where the slopes are too steep for cultivation. The traveler who makes a journey through these regions finds the extent of unbroken forest areas in striking



VIEW SHOWING RECENT NATURAL REFORESTATION IN SOUTHERN ILLINOIS

The forest here shown is a natural growth on land once cleared and farmed for a period of years. (Copyright by Robert Ridgway.)



VIEW LOOKING UP FLOOD PLAIN OF WABASH RIVER FROM TOP OF BLUFF
AT MOUNT CARMEL

The native forest of the river flood plain has been cleared away and the land made into farms. (Copyright by Robert Ridgway.)

contrast with the narrow, open forests along the stream courses in the prairie lands.

The Illinois forests have yielded for home use and for sale important timber products. About two million acres of land are still in forests, and are better adapted to the production of timber crops than farm crops. A scientific forest policy should be developed so that good crops of timber might be harvested



LANDSCAPE VIEW AMONG THE OZARKS NEAR TUNNEL HILL, JOHNSON COUNTY

The log cabin, such as seen at the left of this view, is still common in the forested areas of southern Illinois. (Copyright by Robert Ridgway.)

at intervals throughout an indefinite future. With increasing scarcity of timber and advancing prices of timber products, profitable returns may be had by planting areas of the poorer lands of the state in trees which may be used for various purposes on the farm, on the railroad, or in the mine.

Forests and the pioneer.—Most of the native forests of Illinois occupying good agricultural land have been cleared. Timber not needed for the homestead was burned. This waste of valuable timber was necessary if fertile agricultural

lands were to be put to their best use—the production of crops for food and clothing through proper cultivation of the soil. The pioneer in the Illinois forest could not await a market for his timber products. It was necessary to clear the land by burning the timber in order to raise cereals, other crops, and domestic animals that his family might be supplied with necessary food



VIEW IN VIRGIN FOREST OF THE LOWER WABASH, SHOWING LUXURIANT VINE GROWTH
(Copyright by Robert Ridgway)

and clothing. In densely forested regions the abundance of timber led to the belief that there would always be an ample supply for future use. Hill lands and poor lands were frequently cleared when they should have been kept in trees and given the necessary care to insure a perpetual supply of timber products whether for fuel, railroad ties, posts, or lumber for building purposes. In many cases land of fair agricultural value may

be more profitable to the farmer if preserved as forest than to be cleared and used for farm crops. The annual income from a well-cared-for wood lot may equal or exceed that from the same acreage of farm land. The pioneer or first settler did not carry the destruction of forests farther than his agricultural needs required, as this could not be done, as a rule, during his lifetime. His successors continued the clearing of land so that the timber has been removed from many areas where a well-managed wood lot would have been profitable as a source of timber products for local use.

Native trees of Illinois.—A careful study of the forests of Illinois was made in 1910 and published by the State Laboratory of Natural History. The following extracts and the complete list of trees native to Illinois are from this bulletin:¹

While Illinois is emphatically a prairie state, it has never been so nearly treeless as the states beyond the Missouri. Large districts of southern Illinois were originally densely wooded, and forest belts from three to thirty miles wide extended along the banks, and filled the areas between the forks of rivers.

This study shows that the present forest area of Illinois is about two million acres or $5\frac{1}{2}$ per cent of the total land area.

The distribution of species is governed chiefly by climate and physiography. The southeast portion of Illinois, along the Ohio and Wabash rivers, is the richest in number of species, and in this respect is not surpassed, or perhaps not even equaled by any other region of the United States. There are about one hundred different species of trees found in this part of the state. The valleys of the other large rivers, such as the Mississippi, Kaskaskia, Illinois, and Rock, also contain a great variety of species. Toward the north, the number of species grows less, although there are some belonging to a more northern flora, which do not occur at all in the south. Many southern lowland trees reach the limits of their normal range along stream valleys, as such situations afford shelter and favorable sites on which to grow. On the other hand, others, such as bur oak, which in the south ordinarily grows on wet situations, extend northward on higher, better-drained sites.

The Illinois forests are composed almost entirely of hardwoods, while conifers are few in number and generally restricted in occurrence.

The only evergreens that grow throughout the state are the two sparsely distributed species of juniper one of which, the dwarf juniper, is seldom more than a shrub. The only commercially important native conifer is the bald cypress, which is found in the bottoms of the Cache and Ohio rivers in fairly large quantities. In the south there is also the shortleaf pine, which is confined to small stands along the bluffs of the Mississippi, from opposite Wolf Lake, in Union County, to the southern borders of Jackson County. In the north, white and jack pine are occasional, the latter along the Wisconsin boundary, and the former extending as far south as

¹ R. C. Hall and O. D. Ingall, *Forest Conditions of Illinois*.

Ogle County in the valley of Rock River. Tamarack and arbor-vitae grow near the northern boundary, on low ground.

Among the hardwoods, the oaks and hickories lead in number of species, in number of trees, and in amount of wood. There are nineteen species of oaks and nine of hickories. Among the other important genera that are well represented are the ash, with five species widely distributed. All the important maples are included in the five species, most of which are widely distributed, and on the lowlands often form a large part of the forest. Practically all the important species of elm are found in large quantities, the white and red occurring throughout the state, while the winged elm is restricted to the south and the cork elm to the north. Among the true



ROCKS AT GLEN FERN, JOHNSON COUNTY

Vigorous plant growth may occur where soil conditions seem unfavorable.
(Copyright by Robert Ridgway.)

poplars, the common cottonwood is very widespread while the trembling and largetooth aspens are northern species, and the swamp cottonwood is confined to the extreme southern bottoms.

The black walnut was originally both widespread and fairly abundant but only the smaller sizes are left, and it is very scattered because of the great demand for it in the timber markets. Butternut is also found throughout the state, sparsely scattered throughout the forests. Hornbeam and blue beech are very widely distributed. Beech is found chiefly in the cool valleys of the Ozark Hills, but extends north to some extent up the streams, especially of the Wabash River system. Mulberry is very scattered, with few large specimens, partly because it is eagerly sought after for fence posts. Tulip poplar is widely distributed in the southern half of the state. Sassafras grows everywhere, often in old fields, and very seldom as a large tree. Sweet gum is common throughout the southern bottom lands, and reaches

its best development there. Sycamore is everywhere characteristic of the banks of the streams, and reaches enormous dimensions in the Wabash-Ohio basin.

The various species of crab, thorn, haw, and plum trees never reach large size, and are generally found as an understory to the larger trees. Ohio buckeye is fairly common, but not abundant, along the valley sides of the larger rivers, and sometimes on bottoms, while yellow buckeye is



THE EAGLE'S NEST, NEAR OREGON, OGLE COUNTY

This view shows the natural forest growth along the valley side of a stream in the prairie lands. (Photograph by Eugene J. Hall.)

comparatively rare. The coffee tree is a widely distributed but infrequent tree, found in much the same situations as the buckeyes. The basswoods or lindens are also found throughout the state, but do not often form any great proportion of the stand except in the north, where in limited localities they grow in fair quantities on some of the bottoms of the smaller streams. Black gum occurs over a greater part of the south and central part of the state, where it often forms an appreciable part of the forests; while tupelo

gum, although found in considerable quantities, is confined with cypress to the extreme southern bottoms.

The common catalpa is a naturalized species, but the hardy catalpa is native on the southern bottomlands, where it once attained considerable size and commercial importance as a post timber. Pawpaw and persimmon occur commonly as small trees or bushes. The former is more restricted in range than the latter, occurring most abundantly in the southern third of the state.

Many other species such as sumacs, hornbeam, blue beech, witchhazel, red bud, wahoo, dogwood, and viburnums, are found as small trees or bushes that form an understory in the forest.

The following list shows 129 native and 4 naturalized species. This number includes a few that are seldom more than bushes. On the other hand, it omits many species of *Crataegus*, and perhaps a few of *Pyrus* and *Salix* that are sometimes classed as trees. It does not attempt to include all of the naturalized trees. The preferred common name is given first, followed by other local names that are applied to the same species. The common names are followed by the scientific or botanical name.

LIST OF TREES NATIVE TO ILLINOIS

1. White pine	<i>Pinus strobus</i>
2. Shortleaf pine. Yellow pine	<i>Pinus echinata</i>
3. Jack pine. Scrub pine	<i>Pinus divaricata</i>
4. Tamarack. Larch	<i>Larix laricina</i>
5. Bald cypress	<i>Taxodium distichum</i>
6. Arbor-vitae. White cedar	<i>Thuja occidentalis</i>
7. Red juniper. Red cedar	<i>Juniperus virginiana</i>
8. Dwarf juniper	<i>Juniperus communis</i>
9. Butternut. White walnut	<i>Juglans cinerea</i>
10. Black walnut	<i>Juglans nigra</i>
11. Pecan	<i>Hicoria pecan</i>
12. Bitternut. (Hickory.) Pig hickory	<i>Hicoria minima</i>
13. Water hickory	<i>Hicoria aquatica</i>
14. Shagbark. (Hickory)	<i>Hicoria ovata</i>
15. Shellbark. Bottom or Big shellbark	<i>Hicoria laciniosa</i>
16. Mockernut. (Hickory.) Bullnut Whiteheart hickory. Hardbark hickory	<i>Hicoria alba</i>
17. Pignut. (Hickory)	<i>Hicoria glabra</i>
18. Pale-leaf hickory	<i>Hicoria villosa</i>
19. Black willow	<i>Salix nigra</i>
20. Ward willow	<i>Salix wardii</i>
21. Almondleaf willow	<i>Salix amygdaloides</i>
22. Longleaf willow	<i>Salix fluvialis</i>
23. Glossyleaf willow	<i>Salix lucida</i>
24. Glaucous willow	<i>Salix discolor</i>
25. Bebb willow	<i>Salix bebbiana</i>
26. Aspen. Quaking asp. Trembling aspen. Poplar	<i>Populus tremuloides</i>
27. Largetooth aspen. Poplar. Cotton- wood	<i>Populus grandidentata</i>
28. Swamp cottonwood	<i>Populus heterophylla</i>
29. (Common) Cottonwood	<i>Populus deltoides</i>
30. Paper birch	<i>Betula papyrifera</i>
31. River birch	<i>Betula nigra</i>

32.	Sweet birch. Black birch	<i>Betula lenta</i>
33.	Hornbeam. Hop hornbeam. Ironwood	<i>Ostrya virginiana</i>
34.	Blue beech. Water beech. Hornbeam. Ironwood	<i>Carpinus caroliniana</i>
35.	Beech	<i>Fagus atropunicea</i>
36.	White oak	<i>Quercus alba</i>
37.	Post oak. Run oak	<i>Quercus minor</i>
38.	Bur oak. Mossycup oak. Overcup oak	<i>Quercus macrocarpa</i>
39.	Overcup oak. Bur oak	<i>Quercus lyrata</i>
40.	Chinquapin oak. Pin oak. Chestnut oak. Yellow oak	<i>Quercus acuminata</i>
41.	Swamp white oak. Bur oak	<i>Quercus platanoides</i>
42.	Cow oak. White oak. Bur oak	<i>Quercus michauxii</i>
43.	Texan oak. Red oak. Black oak. Pin oak. Water oak	<i>Quercus texana</i>
44.	Red oak. Black oak	<i>Quercus rubra</i>
45.	Scarlet oak. Red oak. Black oak	<i>Quercus coccinea</i>
46.	Yellow oak. Black oak	<i>Quercus velutina</i>
47.	Spanish oak. Red oak. Black oak	<i>Quercus digitata</i>
48.	Pin oak. Water oak	<i>Quercus palustris</i>
49.	Northern pin oak. Hill's oak. Black oak	<i>Quercus ellipsoidalis</i>
50.	Blackjack. Jack oak	<i>Quercus marilandica</i>
51.	Shingle oak. Laurel oak. Jack oak. Water oak. Pin oak	<i>Quercus imbricaria</i>
52.	Lea oak	<i>Quercus leana</i>
53.	Willow oak	<i>Quercus phellos</i>
54.	Swamp Spanish oak. Red oak. Yellow- bottom oak. Water oak	<i>Quercus pagodaefolia</i>
55.	Slippery elm. Red elm	<i>Ulmus pubescens</i>
56.	White elm. American elm. Water elm	<i>Ulmus americana</i>
57.	Cork elm. Rock elm. Hickory elm	<i>Ulmus racemosa</i>
58.	Wing elm. Winged elm. Wahoo	<i>Ulmus alata</i>
59.	Planer-tree	<i>Planera aquatica</i>
60.	Hackberry	<i>Celtis occidentalis</i>
61.	Sugarberry. Hackberry	<i>Celtis mississippiensis</i>
62.	Red mulberry	<i>Morus rubra</i>
63.	Osage orange. Hedge plant. (Natural- ized)	<i>Toxylon pomiferum</i>
64.	Cucumber tree	<i>Magnolia acuminata</i>
65.	Tulip tree. Yellow poplar. Tulip- poplar. Whitewood	<i>Liriodendron tulipifera</i>
66.	Pawpaw	<i>Asimina triloba</i>
67.	Sassafras	<i>Sassafras sassafras</i>
68.	Witchhazel. Hazel	<i>Hamamelis virginiana</i>
69.	(Red or) Sweet gum. Gum.	<i>Liquidambar styraciflua</i>
70.	Sycamore. Buttonwood. Buttonball tree	<i>Platanus occidentalis</i>
71.	Sweet crab. American crab. Wild crab. Crab apple	<i>Pyrus coronaria</i>
72.	Narrowleaf crab	<i>Pyrus angustifolia</i>
73.	Iowa crab	<i>Pyrus ioensis</i>
74.	Soulard crab	<i>Pyrus soulardi</i>
75.	Serviceberry. June berry. Shadbush	<i>Amelanchier canadensis</i>
76.	Cockspur. Red haw. Cockspur haw	<i>Crataegus crus-galli</i>
77.	Scarlet haw. Red haw. White haw	<i>Crataegus coccinea</i>

78.	Pear haw. Blackthorn. Hawthorn Thorn apple	<i>Crataegus tomentosa</i>
79.	Washington haw	<i>Crataegus cordata</i>
80.	Green haw	<i>Crataegus viridis</i>
81.	Longspine haw	<i>Crataegus macracantha</i>
82.	Downy haw	<i>Crataegus mollis</i>
83.	Dotted haw	<i>Crataegus punctata</i>
84.	Canada plum	<i>Prunus nigra</i>
85.	Wild garden plum	<i>Prunus hortulana</i>
86.	Chickasaw plum. (Naturalized)	<i>Prunus angustifolia</i>
87.	Wild red cherry	<i>Prunus pennsylvanica</i>
88.	Choke cherry	<i>Prunus virginiana</i>
89.	Black cherry. Wild cherry	<i>Prunus serotina</i>
90.	Redbud. Judas tree	<i>Cercis canadensis</i>
91.	Honey locust	<i>Gleditsia triacanthos</i>
92.	Water locust	<i>Gleditsia aquatica</i>
93.	Coffee tree. Coffeebean. Kentucky coffee tree	<i>Gymnocladus dioica</i>
94.	Locust. Black locust	<i>Robinia pseudacacia</i>
95.	Prickly ash	<i>Xanthoxylum clava-herculis</i>
96.	Hoptree. Wahoo	<i>Ptelea trifoliata</i>
97.	Ailanthus. Tree of Heaven. (Naturalized)	<i>Ailanthus glandulosa</i>
98.	Staghorn sumach. Sumac	<i>Rhus hirta</i>
99.	Dwarf sumach	<i>Rhus copalina</i>
100.	Poison sumach	<i>Rhus vernix</i>
101.	Deciduous holly	<i>Ilex decidua</i>
102.	Wahoo. Burning bush. Arrowwood	<i>Erythronium atropurpureum</i>
103.	Sugar maple. Sugartree. Hard maple. Rock maple	<i>Acer saccharum</i>
104.	Black maple	<i>Acer saccharum</i> var. <i>nigrum</i>
105.	Red maple. Soft maple. Swamp maple	<i>Acer rubrum</i>
106.	Box elder. Ash-leaved maple. Negundo maple	<i>Acer negundo</i>
107.	Ohio buckeye	<i>Aesculus glabra</i>
108.	Yellow buckeye	<i>Aesculus octandra</i>
109.	Yellow buckthorn	<i>Rhamnus caroliniana</i>
110.	Basswood. Linn. Linden	<i>Tilia americana</i>
111.	White basswood. Linden	<i>Tilia heterophylla</i>
112.	Angelica-tree. Hercules club	<i>Aralia spinosa</i>
113.	(Flowering) Dogwood	<i>Cornus florida</i>
114.	Blue dogwood. Alternate-leaved dog- wood	<i>Cornus alternifolia</i>
115.	Blackgum. Sour gum. Tupelo	<i>Nyssa sylvatica</i>
116.	Cotton gum. Tupelo	<i>Nyssa aquatica</i>
117.	Tree huckleberry	<i>Vaccinium arboreum</i>
118.	Shittimwood	<i>Bumelia lanuginosa</i>
119.	Buckthorn bumelia	<i>Bumelia lycioides</i>
120.	Persimmon	<i>Diospyrus virginiana</i>
121.	Silverbell-tree	<i>Mohrodendron carolinum</i>
122.	Blue ash	<i>Fraxinus quadrangulata</i>
123.	Black ash	<i>Fraxinus nigra</i>
124.	White ash	<i>Fraxinus americana</i>
125.	Red ash	<i>Fraxinus pennsylvanica</i>
126.	Green ash	<i>Fraxinus lanceolata</i>
127.	Pumpkin ash	<i>Fraxinus profunda</i>

128. (Common) Catalpa. Indian bean Cigar-tree. (Naturalized)	<i>Catalpa catalpa</i>
129. Hardy catalpa	<i>Catalpa speciosa</i>
130. Sheepberry. Black haw	<i>Viburnum lentago</i>
131. Black haw	<i>Viburnum rufidulum</i>
132. Nannyberry. Black haw	<i>Viburnum prunifolium</i>
133. Foresteria. Swamp privet	<i>Foresteria acuminata</i>

Museum specimens of native trees.—A very comprehensive exhibit of the native trees of Illinois is found in the State Natural History Museum at Springfield. Each species of the exhibit is represented by natural sections of the tree showing cross-section, longitudinal section, and radial section. These specimens constitute a permanent display of the more common trees of the native forests of the state, representing 101 species.

Native trees of a small woodland.—A large variety of trees may be found within the limits of a small native woodland. The plants of "Bird Haven," a tract of 18 acres near Olney, Richland County, have been listed by the owner, Mr. Robert Ridgway, America's noted ornithologist. The list given shows how well the term "mixed hardwood forest" applies even to a small tract of the native forests of the Central states.

NATIVE TREES GROWING NATURALLY IN BIRD HAVEN

- I. Conifers. 1. Juniper.
- II. Walnut Family. 2. Butternut. 3. Black walnut. 4. Bitternut.
5. Shellbark hickory. 6. Bottom shellbark; Big shellbark.
7. Mockernut; "Bullnut." 8. Pignut. 9. Downy pignut.
10. Hickory (species undetermined).
- III. Willow or Poplar Family. 11. Black willow. 12. Cottonwood.
- IV. Betula or Birch Family. 13. River birch; Red birch.
- V. Oak Family. 14. Red oak. 15. Pin oak; "Water oak."
16. Schneck's oak. 17. Black oak. 18. Blackjack; Jack oak.
19. Shingle oak; "Laurel oak." 20. White oak. 21. Post oak.
22. Bur oak. 23. Swamp white oak. 24. Chinquapin oak;
Yellow oak.
- VI. Elm Family. 25. White elm. 26. Slippery elm. 27. Rough-leaved
hackberry.
- VII. Mulberry Family. 28. Red mulberry. 29. Osage orange.
- VIII. Magnolia Family. 30. Tulip tree; "Poplar."
- IX. Custard Apple Family. 31. Pawpaw.
- X. Laurel Family. 32. Sassafras.
- XI. Plane-Tree Family. 33. "Sycamore"; Buttonwood.
- XII. Rose Family. 34. Fragrant crab apple. 35. Narrow-leaved crab
apple. 36. One of the hawthorns. 37. One of the hawthorns,
distinct from 36. 38. Wild plum. 39. Downy-leaved wild plum.
40. Wild red plum. 41. Wild-goose plum. 42. Wild black cherry.
- XIII. Legume Family. 43. Redbud. 44. Honey locust.

XIV. Rutaceae. 45. Prickly ash. 46. Wafer ash.
XV. Celastraceae. 47. Wahoo; Burning bush.
XVI. Maple Family. 48. Sugar maple. 49. Red maple. 50. Box elder.
XVII. Dogwood Family. 51. Sour gum; Black gum. 52. Flowering dogwood.
XVIII. Ebony Family. 53. Persimmon.
XIX. Olive Family. 54. White ash. 55. Red ash. 56. Green ash.
XX. Bignonia Family. 57. Catalpa.
XXI. Bubiaceae. 58. Button bush.
XXII. Honeysuckle Family. 59. Black haw.



BIRD HAVEN, A TREE AND BIRD PRESERVE NEAR OLNEY, RICHLAND COUNTY

Bird Haven is owned by Mr. Robert Ridgway America's noted ornithologist. Protection, food, and opportunity for nesting unmolested are furnished to the birds visiting this tract. (Copyright by Robert Ridgway.)

In addition to the foregoing, the white mulberry (60) is growing spontaneously as an exotic in Bird Haven; it is thoroughly naturalized in Richland County.

While Bird Haven is so well supplied with trees growing naturally, these do not constitute all the native plant life of this small area. Probably no other forest area of Illinois has had all its vegetation so carefully and accurately listed as Bird

Haven. Mr. Ridgway's detailed lists show the great variety of plant life to be found on a small area of Illinois woodland. Of woody species growing naturally, there were 60 trees, 17 shrubs, and 12 climbers, a total of 89 native plants. In addition, other woody species native to Illinois have been planted in Bird Haven as follows: trees 13, shrubs 6, and climbers 3, or 22 in all, making a total of woody plants of 111 species. To this number a list must be added of 227 herbaceous plants, growing naturally, making a grand total of 338 plant species accurately determined.

White-pine forest.—A native forest area in northern Illinois is described as follows in a pamphlet issued by the White Pine Forest Association.

The White Pine Forest consists of a tract of about 500 acres situated in the western part of Ogle County. The main line of the Chicago, Burlington and Quincy Railway from Chicago to Minneapolis passes along the edge of the forest, and the station of Stratford is one mile distant. The picturesque stream of Pine Creek traverses the forest from north to south. In many places the stream runs at the base of high limestone cliffs. These cliffs and almost perpendicular walls are overgrown with ferns and moss in great profusion.

Over thirty different varieties and species of hardwoods have been counted growing on the tract, including oaks, elms, maples, walnuts, butternut, hickory, ash, cherry, sycamore, etc.

Wild flowers native to Illinois are found on every hand.

But the chief attraction is the White Pine Woods. Some eleven acres of these beautiful and magnificent trees remain undisturbed. Many of these trees are 2 to 2½ feet in diameter and rear their heads 90 to 100 feet skyward. Their branches so closely interweave as almost to exclude the sunlight. In another section of the tract splendid red cedars are growing. Throughout the grounds occupied by the hardwood trees, young white pines are springing up on every hand, and need only protection from fire and stock to make splendid trees in a few years. Sufficient of these could be transplanted to add many acres to the present pine woods.

The state should purchase and preserve this tract. This is valuable land which others stand ready to buy for the timber that is on it and for the value of the agricultural lands after the timber is cut off.

The White Pine Forest tract is easy of access from the cities of northern Illinois, and in case it is set apart as a State Park, the roads leading to the White Pines would be greatly improved. That these Pines should be preserved cannot be denied.

The purchase of this forested tract has been considered by several legislatures. The location of the white pines in a region easy of access from many cities, and near the Lincoln Highway with its throngs of transcontinental tourists, is ideal for a state park consisting of a native forest in the Prairie State.

Prairies of Illinois.—The explorers and early settlers marveled at the great stretches of prairies in central and northern Illinois. They had been accustomed to the continuous forest lands of more eastern states, and were surprised to find large areas of unwooded tracts covered with a rich growth of grass. The causes of the Illinois prairies are not fully understood. Illinois is the transition belt between the unbroken original forests to the east and south and the vast prairie regions farther westward. The following is a brief statement of the various theories concerning the origin of the Illinois prairies:

The prairies of northern Illinois aroused the wonder of all early travelers. They were attributed to fires; to hurricanes which had blown down the timber, leaving it to be readily consumed by fire, when dry; to the former presence of lakes; and to other causes. The upland prairies are now generally thought to be due to the undrained condition of the flattish inter-stream areas, which practically prevented the growth of the species of trees adapted to the latitude. Occasional protracted droughts and fires, furthermore, doubtless served to kill any young trees that had succeeded in establishing themselves. Summer droughts were especially effective in killing seedlings on the sandy terraces of the Illinois valley, where they were probably a chief cause of the general absence of trees.¹

The original prairie, much more fully than the original forest, has disappeared from the Illinois landscape. While original forest areas of considerable size are still supporting native timber, no typical area of upland prairie remains for examination and study. It may be of interest to the reader, therefore, to see the prairies through descriptions written, published, and read more than 80 years ago, at a time when these grasslands were in their natural state and the tide of immigration was just beginning to go beyond the edge of the well-known and long-tested forest areas into the unknown and uncertain prairie regions. The following extracts from *Illinois in 1837 & 38* give an idea of the prairies as they were seen by writers of that date:

Undoubtedly the most remarkable feature of the state of Illinois is its extensive prairies or unwooded tracts. In general, they are covered with a rich growth of grass forming excellent natural meadows, from which circumstance they take their name. *Prairie* is a French word, signifying *meadow*.

The Indians and hunters annually set fire to the prairies in order to dislodge the game. The fire spreads with tremendous rapidity, and pre-

¹ H. H. Barrows, *Geography of the Middle Illinois Valley*.

sents one of the grandest and most terrible spectacles in nature. The flames rush through the long grass with a noise like thunder; dense clouds of smoke arise; and the sky itself appears almost on fire, particularly during the night. Travellers then crossing the prairie are sometimes in serious danger which they can only escape by setting fire to the grass around, and taking shelter in the burnt part where the approaching flames must expire for want of fuel. Nothing can be more melancholy than the aspect of a burnt prairie, presenting a uniform black surface like a vast plain of charcoal.

It is well known that in the richest and most dry and level tracts, the aboriginal inhabitants, before they had the use of fire-arms, were in the habit of enclosing their game in circular fires in order that it might bewilder and frighten the animals, and thus render them an easy prey.

From whatever cause the prairies at first originated, they are undoubtedly perpetuated by the autumnal fires that have annually swept over them from an era probably long anterior to the earliest records of history. Along the streams and in other places where vegetation does not suffer from the drought, the fire does not encroach much; consequently the forests prevail there, and probably increase in some places upon the prairies. As soon as the prairies are plowed and the heavy grass kept under, young timber begins to sprout, particularly such as is produced by winged seeds, as cottonwood, sycamore, etc.

When the tough sward of the prairie is once formed, timber will not easily take root. Destroy the prairie turf by the plow or by any other method and it is soon converted into forest land. There are large tracts of country in the older settlements where, a number of years ago, the farmers mowed their hay, and these tracts are now covered with a forest of young timber of rapid growth.

As soon as timber or orchards are planted in the prairies, they grow with unexampled luxuriance. A correspondent writes from Adams County that "locust trees, planted, or rather sown, on prairie land near Quincy, attained in four years a height of 25 feet and their trunks a diameter of from 4 to 5 inches. These grew in close, crowded rows, affording a dense and arbory shade. In a few instances where the same kind of trees had been planted out in a more open manner, they grew in the same period to a thickness of 6 inches, and in from seven to ten years from their planting, have been known to attain sufficient bulk to make posts and rails."

From May to October, the prairies are covered with tall grass and flower-producing weeds. In June and July, they seem like an ocean of flowers of various hues, waving to the breezes which sweep over them. The numerous tall flowering shrubs which grow luxuriantly over these plains present a striking and delightful appearance. The bushes are often over-topped with the common hop.

In the prairie region there are numerous ponds; some are formed from the surface water, the effect of rain and the melting of snows in the spring, and others near the rivers from their overflowing.

In the southern part of the state, the prairies are comparatively small, varying in size from those of several miles in extent to those which contain only a few acres. As we go northward, they widen and extend on the more elevated ground between the watercourses to a vast distance, and are frequently from six to twelve miles in width. Their borders are by no means uniform, but are intersected in every direction by strips of forest land advancing into and receding from the prairie towards the watercourses whose banks are always lined with timber, principally of luxuriant growth. Between these streams, in many instances, are copses and groves of timber containing from 100 to 2,000 acres in the midst of the prairies like islands in the ocean.

The largest tract of prairie in Illinois is denominated the Grand Prairie. Under this general name is embraced the country lying between the waters which fall into the Mississippi and those which enter the Wabash rivers. It does not consist of one vast tract, boundless to the vision, and uninhabitable for want of timber, but is made up of continuous tracts with points of timber projecting inward and long arms of prairie extending between the creeks and smaller streams.

The southern points of the Grand Prairie are formed in the northeastern parts of Jackson County. Grand Prairie then extends in a northeastern course between the streams, varying in width from 1 to 10 or 12 miles, through Perry, Washington, Jefferson, Marion, Fayette, Effingham, and Coles into Champaign and Iroquois counties where it becomes connected with the prairies that project eastward from the Illinois River and its tributaries. A large arm lies in Marion County between the waters of Crooked Creek and the east fork of the Kaskaskia River.

A prejudice at one time prevailed against the prairies as not being fit for cultivation; but this was found to be erroneous, and they are more in request as it is a most important object to save the labor of clearing the wood.

The first improvements are usually made on that part of the prairie which adjoins the timber; and thus we may see at the commencement, a range of farms circumscribing the entire prairie as with a belt. The burning of the prairies is then stopped the whole distance of the circuit in the neighborhood of these farms to prevent injury to the fences and other improvements. This is done by plowing two or three furrows all round the settlement. In a short time the timber springs up spontaneously on all the parts not burned, and the groves and forests commence a gradual encroachment on the adjacent prairies. By and by you will see another tier of farms springing up on the outside of the first, and farther out in the prairie. Thus farm succeeds farm until the entire prairie is occupied.

In breaking up prairie land three or four yoke of oxen are required. The shear plow turns up about 18 to 24 inches of turf at a furrow to a depth of 3 to 4 inches. The sod turns entirely over so as to lay the grass down, and it fits furrow to furrow smoothly enough to harrow and sow wheat. It is usual to break it up in May, and drop corn along the edge of every fourth row. This is called *sod corn*. No working or plowing is necessary the first season. The sod is left lying for the grass to decay; and after the next winter's frost it crumbles and becomes light and friable.

The sod corn does not make more than half a crop. It is cut up for fodder for stock. The next year the crop of corn is most abundant, averaging 50 bushels per acre. Well cultivated wheat averages 25 to 30 bushels; rye 25 to 35; and oats 40 to 60 bushels per acre. Irish potatoes, timothy hay, and all the different garden vegetables yet tried yield most abundantly. A man here can tend double the quantity of corn that he can in newly settled timbered countries as there are no stumps to obstruct the plow or hoe.

The prairies are generally from one to six miles in width; of course, about three miles is the farthest distance from timber, and the prairie constitutes the finest natural road possible to haul on. The settlements are at present chiefly confined to the margins of the timber and prairie.

The prairie lands are undoubtedly worth from \$10 to \$15 per acre more for farming than those that are timbered, not only because they are richer, but because it would take at least that sum per acre to put the timbered lands of Ohio and Indiana in the same advanced state of cultivation.

The prairies are the highest as well as the most level land, and the roads generally pass through the middle of them, from whence there is an

easy slope on each side, at first barely sufficient to drain the waters towards the sides of the prairies or to the nearest point of timber.

Few have, as yet, settled out in the middle of the prairie on account of the distance from timber to build fence, etc. Those who have done so have invariably found it to their interest; and the practice will no doubt in a short time become general, until the whole of the extensive prairies of Illinois will be covered with valuable and productive farms. The middle of the prairie is not only the highest and most level, but it is the most fertile land. As the surface descends towards the timber, it has an increased unevenness and ruggedness, and the greater the descent in perpendicular depth, the less fertile is the soil.

The grass which covers the prairies in great abundance is tall and coarse in appearance. In the early stages of its growth it resembles young wheat, and in this state furnishes a succulent and rich food for cattle. They have been seen, when running in the wheat fields where the young wheat covered the ground, to choose the prairie grass on the margins of the fields in preference to the wheat. It is impossible to imagine better butter than is made while the grass is in this stage. Cattle and horses that have lived unsheltered and without fodder through the winter and in the spring, scarcely able to mount a hillock through leanness and weakness, are transformed, when feeding on this grass, to a healthy and sleek appearance as if by a charm. When the prairie grass is two or three feet high it is suitable for hay and is mowed by the farmers for winter use.

Sand and swamp vegetation.—While almost all of Illinois was originally covered by forests and upland prairies, there were regions of sand and swamp which had their characteristic vegetation. Much of the sand areas have been brought under cultivation, but thousands of acres still exist in their original condition. The bunch-grass association of plants originally occupied more than nine-tenths of the unforested portion of the sand area. The bunch-grass formation extended over hill and dale except where interrupted by "blowouts," areas of bare sand where depressions have been formed by wind action. The principal vegetation of these "sand prairies" consists of ten species of bunch-grass, the bunches of the various species varying from four inches to three feet in diameter.

The principal sand areas are in the northern half of the state and on the flood plains on the east sides of rivers. The Havana area extends from Pekin in Tazewell County to Meredosia in Morgan County, a distance of 75 miles. The plain reaches a width of 14 miles in Mason County. While the sand deposits occupy only a portion of the area, their aggregate extent is estimated at 179,000 acres. The Hanover area of nearly 6,000 acres lies in the second bottoms of the Mississippi Valley in Jo Daviess County. The Oquawka area is along the

Mississippi in Henderson and Mercer counties; the Amboy area along Green River in Lee County. The Kankakee area of 3,000 square miles lies mainly in Indiana; about one-fourth is in Iroquois and Kankakee counties of Illinois.

Extensive areas of the upland prairies were swamp lands occupied by vegetation appropriate to the natural conditions. These upland swamps have been so fully drained and cultivated that their natural vegetation has disappeared almost as completely as that of the typical well-drained prairies. Skokie Marsh in Lake and Cook counties still exhibits much of its natural vegetation. This marsh is about 8 miles long and 1 mile wide and contains a native flora of 217 species.

CHAPTER VII

NATIVE ANIMALS

Conditions for animal life.—The forests, prairies, streams, and lakes of Illinois in their natural state furnished favorable conditions for a varied and abundant animal life. Numerous species of mammals were found throughout the state varying in size from mice to buffaloes. The black bear was common in the wooded districts; the buffalo on the prairie; the deer and elk throughout the state both in forest and on grasslands; the beaver, otter, and muskrat along the streams. The leaves and twigs of trees, nuts, berries, roots, and the rich prairie grasses furnished a plentiful food supply for animals depending wholly on plants. The flesh-eating animals such as the wolf and bear found abundant food among the smaller mammals, and often among the larger animals. They also ate largely of birds and their eggs. The otter and other animals frequenting streams were skilful in securing fish, crayfish, and other food supplies from the water.

Bird life was exceedingly abundant in response to plentiful food supplies in the form of berries, fruits, insects, seeds of grasses and other herbaceous plants, and to favorable breeding grounds throughout the state. The passenger pigeon, now extinct, was found in flocks of many thousands. The prairie hen was so abundant that a hunter could kill dozens of them in a single day. Wild turkeys were common, and wild ducks and wild geese frequented the waters of the state in great flocks.

Frogs, snakes, and turtles were common. The streams and lakes abounded in fish. Myriads of insects were present in forest, prairie, swamp, and stream. The fresh-water mollusk, which was later to become a source of an important industry, was abundant.

Man and native animals.—Prior to the coming of the white man to Illinois, a balance had been fairly well developed among the physical features, the native plant life, the native animal life, and the native human life of the state. Soil,

surface, rainfall, and temperature had determined the character and profusion of vegetation; the vegetation had determined the nature and amount of animal life; while the Indian had adjusted himself to the natural environment in which he lived. The white man came with a knowledge of agriculture, mining, manufacturing, and commerce. He brought about such changes as best suited his method of life. In doing so, he wrought profound changes in the native animal life of the state.

He soon occupied Illinois in greater numbers than the Indian had ever done. With his more powerful weapons and the necessity for food, he was soon destroying the native food animals more rapidly than the Indian had found possible with his crude instruments of the chase. By clearing the forest and breaking the prairie, he destroyed many of the breeding and feeding grounds of native mammals and native birds. By pollution of streams and by over-fishing, the abundant life of the lakes and streams declined, and his efforts to restore the balance have taken form in artificial propagation of fishes. His introduction of cultivated plants and domesticated animals more than overbalanced the destruction of natural plant and animal life. By his methods the Illinois country was to support, in less than a hundred years after statehood was attained, a population of 100 persons per square mile where not 1 per square mile had lived in the days of Indian occupation.

Animal life in pioneer days.—The following extracts from *Illinois in 1837 & '38* give a glimpse of the animals of pioneer days as seen by writers of that day:

There are several kinds of wild animals in the state of Illinois. The principal and most numerous are deer, wolves, raccoons, opossums, etc. Several species formerly common have become scarce, and are constantly retreating before the march of civilization; and some are no longer to be found. The buffalo has entirely left the limits of the state. This animal once roamed at large over the plains of Illinois; and, so late as the commencement of the present century, was found in considerable numbers. Traces of them still remain in the buffalo paths, which are seen in several parts of the state.

Deer are more abundant than at the first settlement of the country. They increase to a certain extent with the population. The reason of this appears to be that they find protection in the neighborhood of man from the beasts of prey that assail them in the wilderness. Immense numbers of deer are killed every year by the hunters.

Many of the frontier people dress in deer skins, making them into pantaloons and hunting shirts.

The elk has disappeared. A few have been seen in late years, but it is not known that any remain at this time within the limits of the state.

The bear is seldom seen. This animal inhabits those parts of the country that are thickly wooded. The meat is tender and finely flavored, and is esteemed a great delicacy.

Wolves are numerous in most parts of the state. They are very destructive to sheep, pigs, calves, poultry, and even young colts. Their most common prey is the deer. When tempted by hunger they approach the farm houses in the night, and snatch their prey from under the very eyes of the farmer.



BUFFALO IN LINCOLN PARK, CHICAGO

The buffalo, once common on the Illinois prairies, is now found only in parks.
(Copyright by Keystone View Company.)

The fox abounds in some places in great numbers, though, generally speaking, the animal is scarce. It will undoubtedly increase with the population.

The panther and wild cat are occasionally found in the forests.

The beaver and otter were once numerous, but are now seldom seen except on the frontiers.

There are no rats except along the large rivers where they have landed from the boats.

Wild horses are found ranging the prairies and forests in some parts of the state. They are found chiefly in the lower end of the American Bottom.

The gray and fox squirrels often do mischief in the corn fields, and the hunting of them makes fine sport for the boys.

The gopher is a singular little animal about the size of a squirrel. It burrows in the ground and is seldom seen, but its works make it known.

The polecat is very destructive to poultry.

The raccoon and opossum are very numerous and extremely troublesome to the farmer, as they not only attack his poultry, but plunder his corn fields. They are hunted by boys, and large numbers of them are destroyed. The skins of the raccoon pay well for the trouble of taking them, as the fur is in demand.

Rabbits are very abundant and in some places extremely destructive to the young orchards and to garden vegetables. Young apple trees must



AMERICAN RED DEER, STATE MUSEUM, SPRINGFIELD

Group of deer in the State Natural History Museum at Springfield. A few deer are still found in the southern part of the state. (Copyright by Keystone View Company.)

be protected at the approach of winter by tying straw or corn stalks around their bodies for two or three feet in height, or the bark will be stripped off by these mischievous animals.

The ponds, lakes, and rivers, during the spring and autumn and during the migrating season of water fowls, are literally covered with swans, pelicans, cranes, geese, brants, and ducks of all the tribes and varieties. Many of these fowls rear their young on the islands and sand bars of the large rivers. In the autumn, multitudes of them are killed for their quills, feathers, and flesh.

The prairie fowl is seen in great numbers on the prairies in the summer and about the corn fields in the winter. This is the grouse of the New York market. They are easily taken in the winter, and when fat are excellent for the table.

Quail are taken with nets in the winter, by hundreds in a day, and furnish no trifling item in the luxuries of the city market.

Bees are to be found in the trees of every forest. Many of the frontier people make it a prominent business after the frost has killed the vegetation to hunt them for the honey and wax, both of which find a ready market. Bees are profitable stock for the farmer, and are kept to a considerable extent.

Poisonous reptiles are not so common as in unsettled regions of the same latitude where the country is generally timbered. Burning the prairies undoubtedly destroys multitudes of them.

Animal life of today.—The present state of wild animal life in Illinois is well set forth in the *Annual Reports* of the Game and Fish Conservation Commission for 1913-16. The following extracts are taken from these reports:

There are very few wild animals in the state of Illinois that are in the class of game animals or fur-bearing animals. At the present time there are a few deer in the southern part of the state. In the Sangamon River bottoms there is a herd of wild deer, about thirty-five in number. These deer, originally owned by private parties, were turned loose a few years ago, and they have gradually increased in numbers.

Occasionally a bear is seen in the wild bottom lands of the Mississippi River.

Of the smaller variety of animals, we have the squirrels and the rabbit. The squirrel is very hardy and well able to care for himself if given the opportunity. Where there is even a small amount of woodland these busy little fellows are to be found. Under a good system of protection they are likely to hold their present status.

Rabbits are numerous in all parts of the state, and while they are not regarded by law as a game animal, and are without legal protection, they nevertheless furnish good sport for the hunter and add materially to the food supply of the state. Because of his tendency to bark young orchards, he has been made an outlaw that any one may kill at any season of the year.

Of fur-bearing animals there are but few. In places, the muskrat is sufficiently numerous to attract the trapper. His fur has a real value, and for that reason this animal is well worth protecting. Mink are not numerous, but some are caught by trappers along our water courses.

The fox and the wolf are by no means plentiful throughout the state, but in those sections where there are large tracts of timber land many of these animals are to be found. The hunter regards them primarily as of value because of his love of the chase. In addition, the furs of these animals have a commercial value. The farmer looks upon the wolf and the fox as a pair of thieves that should be exterminated because of their fondness for young pigs and domestic fowls.

At the present high value of farming land, the farmer cannot afford to maintain much woodland and other places that are haunts of wild animals. It is therefore probable that we shall see a decrease in all these animals, except, possibly, the rabbit, and he is not likely to be as plentiful in the future as he is now.

A goodly number of prairie chicken are still to be found in the state, but no method of game conservation can bring it back in such numbers as formerly, because the character of the country has been changed by the white man's plow. Proper care and protection, however, may increase the number so that, in all parts of the state, an opportunity to kill a small number of these birds each year may be offered to the sportsmen.

At the present time there are not enough quails in the northern counties of the state to make quail shooting attractive. In the southern counties where there is more cover, good shooting is to be had, although not so good as ten years ago. With aid of game reservations it is hoped that in some sections the supply will be kept up. In the closely tilled country, quails will be scarcer.

There are but few wild turkeys left in Illinois. In the southern part of the state where there are large tracts of timber and swamp land, this bird is still to be found in fair numbers. As a table bird it outranks the domestic turkey.

The Mississippi River and the Illinois River hold myriads of wild fowl in season. There is not, of course, the great number of ducks to be found on these waters that there were many years ago, but there is still a good supply, and this supply is likely to be kept up now that there is a disposition to do away with the late spring shooting.

Our best duck, of course, is the canvas back, which, though never numerous, is sufficiently plentiful in sections of the state to afford good sport.

The mallard and teal, both splendid ducks, are to be found in fairly good numbers in all parts of the state.

The wood duck, which breeds regularly in the state, is one of our most beautiful ducks.

Brant and geese follow the same course to the North and South that our ducks take, but they are not disposed to remain in our waters very long while on their migrations. Both are exceedingly wary birds and keep away as much as possible from the shooting territory frequented by sportsmen.

It is an important duty of the commission to consider the welfare of our song and insectivorous birds. Nearly all of our non-game birds live wholly or in part upon insect life and noxious weeds. These birds, as well as the game birds, are being encouraged through game reservations where they can nest and rear their young undisturbed.

Mammals of Illinois.—The following list includes all of the species of mammals now living in Illinois or known to have lived in the state since first visited by the white man. The limits of space permit the use of only the common names for family and species:

- I. Opossum Family. 1. Virginian opossum.
- II. Deer Family. 2. Virginia deer, White-tailed deer. 3. Northern White-tailed deer. 4. American elk.
- III. Cattle Family. 5. American bison or buffalo.
- IV. Squirrel Family. 6. Southern flying squirrel. 7. Western fox squirrel. 8. Southern gray squirrel. 9. Northern gray squirrel. 10. Southern red squirrel. 11. Chipmunk. 12. Gray-striped chipmunk. 13. Striped ground squirrel, "Gopher." 14. Franklin's ground squirrel, "Gray gopher." 15. Woodchuck, Ground hog.

- V. Beaver Family. 16. Beaver.
- VI. Family of Rats and Mice. 17. House mouse. 18. Norway rat. House rat. 19. White-footed mouse. 20. Northern white-footed mouse. 21. Prairie white-footed mouse. 22. Western cotton mouse. 23. Southern golden mouse. 24. Rice field mouse. 25. Illinois wood rat. 26. Meadow mouse. 27. Prairie meadow mouse. 28. Mole mouse. 29. Muskrat. 30. Goss's lemming mouse.
- VII. Pocket Gopher Family. 31. Pocket gopher.
- VIII. Jumping Mouse Family. 32. Hudson Bay jumping mouse.
- IX. Rabbit Family. 33. Cotton-tail rabbit, Gray rabbit. 34. Swamp rabbit.
- X. The Cat Family. 35. Panther, Cougar. 36. Canada lynx. 37. Wild cat, Bay lynx, Bob cat.
- XI. Wolf Family. 38. Gray fox. 39. Wisconsin gray fox. 40. Red fox. 41. Prairie wolf, Coyote.
- XII. Otter Family. 42. Canada otter. 43. Northern skunk. 44. Illinois skunk. 45. Alleghenian spotted skunk. 46. American badger. 47. Mink. 48. New York weasel. 49. Fisher.
- XIII. Raccoon Family. 50. Raccoon.
- XIV. Bear Family. 51. Black bear.
- XV. Shrew Family. 52. Common shrew. 53. Carolina shrew. 54. Mole shrew. 55. Carolina short-tailed shrew. 56. Small short-tailed shrew.
- XVI. Mole Family. 57. Prairie mole. 58. Star-nosed mole.
- XVII. Bat Family. 59. Little brown bat. 60. Gray bat. 61. Say's bat. 62. Silver-haired bat. 63. Georgian bat. 64. Brown bat. 65. Red bat. 66. Hoary bat. 67. Rafinesque bat.¹

An examination of the list shows that the 67 species of Illinois mammals are distributed among 17 families; each of 7 families is represented by a single species; 6 other families have 2, 3, 4, or 5 species each; of the 4 remaining families, the Otter Family is represented in Illinois by 8 species; the Bat Family by 9 species; the Squirrel Family by 10 species; and the family of Rats and Mice by 14 species.

If the 17 families be grouped from the standpoint of the size of the animals, 7 families may be designated as *small*, 7 as *medium*, and 3 as *large*. The 7 families of small mammals include 42 of the 67 species varying in size from the smallest of mice to the largest of the squirrels. The 7 families whose members are here considered as medium sized include 20 species varying in size from the rabbit and opossum to the wolf and the beaver. The 3 families of large mammals include 5 species—the Virginia Deer, the Northern White-tailed Deer, the American Elk, the Black Bear, and the American Bison or Buffalo.

¹ Charles B. Cory, *The Mammals of Illinois and Wisconsin*, Field Museum of Natural History.

Birds of Illinois.—In Illinois there have been found 365 species of birds. The following list includes 141 species of the more common birds. Probably 100 of these can be found in almost any county of the state.

WATER BIRDS

- I. Grebe Family. 1. Pied-billed grebe.
- II. Loon Family. 2. Loon.
- III. Gull Family. 3. Herring gull. 4. Bonaparte's gull. 5. Black tern.
- IV. Cormorant Family. 6. Double-crested cormorant.
- V. Duck Family. 7. American merganser. 8. Hooded merganser. 9. Mallard. 10. Baldpate. 11. Green-winged teal. 12. Blue-winged teal. 13. Shoveller. 14. Pintail. 15. Wood duck. 16. Redhead. 17. Canvasback. 18. Lesser scaup duck. 19. American golden-eyed. 20. Bufflehead. 21. Lesser snow goose. 22. Canada goose. 23. Hutchins goose.
- VI. Heron Family. 24. American bittern. 25. Great blue heron. 26. Little green heron. 27. Black-crowned night heron.
- VII. Rail Family. 28. King rail. 29. Virginia rail. 30. Carolina rail. 31. Florida gallinule. 32. American coot.
- VIII. Snipe Family. 33. American woodcock. 34. Wilson snipe. 35. Greater yellow legs. 36. Yellow legs. 37. Bartramian sandpiper. 38. Spotted sandpiper.
- IX. Plover Family. 39. American golden plover. 40. Killdeer.

LAND BIRDS

- X. Grouse Family. 41. Bob white. 42. Ruffed grouse. 43. Prairie hen. 44. Wild turkey.
- XI. Pigeon Family. 45. Mourning dove.
- XII. Vulture Family. 46. Turkey vulture.
- XIII. Hawk Family. 47. Marsh hawk. 48. Sharp-shinned hawk. 49. Cooper hawk. 50. Red-tailed hawk. 51. Golden eagle. 52. Bald eagle. 53. American osprey.
- XIV. Owl Family. 54. Barred owl. 55. Screech owl. 56. Great horned owl. 57. Snowy owl.
- XV. Cuckoo Family. 58. Yellow-billed cuckoo. 59. Black-billed cuckoo.
- XIV. Kingfisher Family. 60. Belted kingfisher.
- XVII. Woodpecker Family. 61. Hairy woodpecker. 62. Northern downy woodpecker. 63. Yellow-bellied sapsucker. 64. Red-headed woodpecker. 65. Red-bellied woodpecker. 66. Northern flicker.
- XVIII. Goatsucker Family. 67. Whippoorwill. 68. Night hawk.
- XIX. Swift Family. 69. Chimney swift.
- XX. Hummingbird Family. 70. Ruby-throated hummingbird.
- XXI. Flycatcher Family. 71. Kingbird. 72. Great-crested flycatcher. 73. Phoebe. 74. Wood pewee. 75. Green-crested flycatcher.
- XXII. Lark Family. 76. Horned lark. 77. Prairie horned lark.
- XXIII. Crow Family. 78. Blue jay. 79. American crow.

XXIV. Blackbird Family. 80. Bobolink. 81. Cowbird. 82. Yellow-headed blackbird. 83. Red-winged blackbird. 84. Meadowlark. 85. Orchard oriole. 86. Baltimore oriole. 87. Rusty blackbird. 88. Bronzed grackle.

XXV. Sparrow Family. 89. Evening grosbeak. 90. Purple finch. 91. American crossbill. 92. White-winged crossbill. 93. Redpoll. 94. American goldfinch. 95. Snowflake. 96. Vesper sparrow. 97. Grasshopper sparrow. 98. White-throated sparrow. 99. Tree sparrow. 100. Slate-colored junco. 101. Fox sparrow. 102. Towhee. 103. Cardinal. 104. Rose-breasted grosbeak. 105. Indigo bunting. 106. Dickcissel.

XXVI. Tanager Family. 107. Scarlet tanager. 108. Summer tanager.

XXVII. Swallow Family. 109. Purple martin. 110. Cliff swallow. 111. Barn swallow. 112. Tree swallow. 113. Bank swallow.

XXVIII. Waxwing Family. 114. Cedar waxwing.

XXIX. Shrike Family. 115. Northern shrike. 116. Loggerhead shrike.

XXX. Vireo Family. 117. Red-eyed vireo. 118. Warbling vireo.

XXXI. Warbler Family. 119. Black and white warbler. 120. Yellow warbler. 121. Oven bird. 122. Northern yellowthroat. 123. American redstart.

XXXII. Wren and Thrasher Family. 124. Mocking bird. 125. Catbird. 126. Brown thrasher. 127. Carolina wren. 128. Bewick wren. 129. House wren. 130. Short-billed marsh wren. 131. Long-billed marsh wren.

XXXIII. Creeper Family. 132. Brown creeper.

XXXIV. Chickadee Family. 133. White-breasted nuthatch. 134. Red-breasted nuthatch. 135. Tufted titmouse. 136. Chickadee.

XXXV. Kinglet Family. 137. Golden-crowned kinglet. 138. Ruby-crowned kinglet.

XXXVI. Thrush Family. 139. Wood thrush. 140. American robin. 141. Bluebird.¹

The foregoing is but a partial list of birds now found within the state.

Of the 365 species of birds which have been found in Illinois, 129 are classified as water birds and 236 as land birds. These include a total of 52 families. Each of 13 families is represented by a single species; 12 other families are each represented by 2 species; 16 additional families are each represented by fewer than 10 species, and 6 families have 10 to 13 species each. The 5 remaining families contain 180 species, or nearly one-half of the total for the state. The Hawk Family has 26 species; the Snipe Family 28; the Warbler Family 39; the Duck Family 41; and the Sparrow Family 46.

The large number and great variety of species of birds in Illinois at present indicate that the conditions for bird life

¹ D. Lange, *How to Know the Wild Birds of Illinois*, Illinois Audubon Society.

throughout the state are still good, although not so favorable as originally. The bird life of small areas has been carefully and scientifically studied in some portions of the state. Mr. Robert Ridgway has observed 134 species on Bird Haven, a tract of woodland of 18 acres in Richland County; 53 species of this number breed on the adjoining farm. On the campus of the Illinois State Normal University, 56 acres in extent, there have been observed 138 species, and 80 species have been identified in one season in Normal, Illinois, on a city lot 66 feet by 198 feet in size. More than 150 species have been identified in Lincoln Park, Chicago.

Density of bird population.—In June, July, and August, 1907, a special survey was made under the direction of Professor S. A. Forbes to determine the abundance of birds in Illinois. Two observers traversed 428 miles in the southern, central, and northern parts of the state. They counted all the species and all the individuals on a total area of 7,693 acres. They found 85 species and 7,740 individuals. This gives a density of 645 birds per square mile, or almost precisely 1 bird per acre. On this basis, Illinois contained 36,000,000 birds. The English sparrow was the most numerous, making up 18 per cent of the individuals observed; the meadow lark constituted 13 per cent; the bronzed grackle 11 per cent; the mourning dove 6 per cent; and the dickcissel 5 per cent. Others, constituting more than 1 per cent, and in order of abundance, were: red-winged blackbird, prairie horned lark, flicker, robin, field sparrow, American goldfinch, kingbird, bobolink, grasshopper sparrow, brown thrasher, cowbird, red-headed woodpecker, barn swallow, quail, Bartramian sandpiper, and crow. These 21 species included 85 per cent of the individuals observed.

The English sparrow decreases in abundance from north to south. The meadow lark increases in abundance from north to south as does the total of bird life. For every 100 birds counted in northern Illinois, 133 were found in central Illinois and 181 in southern Illinois. These Illinois birds showed a decided preference for prairie and woodland conditions. Fifty per cent of the birds were found in pastures and meadows which constituted only 36 per cent of the land surveyed. Birds

were about one-third as abundant in cornfields as in grasslands; and in small grains they were twice as abundant as in corn. In orchards they averaged $4\frac{1}{2}$ times as numerous as in fields of grain, 2,471 to the square mile. Among native trees and shrubbery the density of birds averaged 1,451 per square mile.

Reptiles and batrachians.—Reptiles include snakes, lizards, and turtles; batrachians include mud-puppies, salamanders, toads, and frogs. Natural conditions in Illinois were favorable for the development of a varied and somewhat abundant life of reptiles and batrachians. The march of the white man, however, has made the existence of these forms of life more difficult than formerly. The poisonous rattlesnake, once abundant, has been nearly exterminated. Garter snakes, bull snakes, moccasins, grass snakes, and blue racers are common in Illinois at the present time. Turtles are common, especially along the Illinois river, and they are of commercial importance; \$15,000 worth have been marketed in a single year. The extensive drainage of swamps has greatly reduced the number of frogs of the state.

Fishes of Illinois.—The entire fish life of Illinois comprises 150 species. A comprehensive study of them has been published by the Natural History Survey of the state.

About three dozen of our 150 species of Illinois fishes have a marketable value as food, and a dozen more may be classed as edible, although not popular enough or abundant enough within our limits to have any commercial value as Illinois products. A dozen of the more useful species are of really good quality, and half of these are among the best of the fresh-water species. In the following list the edible species are distinguished in classes of graduated importance, according to our judgment of the estimation in which these fishes are generally held. A few species are put in a lower class than their quality would call for because of their infrequent occurrence in our fisheries.

First class.—Whitefish, Great Lake trout, blue cat, channel-cat, mud-cat, common pike, white crappie, black crappie, bluegill, small-mouthed black bass, large-mouthed black bass, wall-eyed pike.

Second class.—Golden shad (rare), northern mooneye (rare), lake herring, eel, Missouri sucker, red-mouth buffalo, mongrel buffalo, small-mouth buffalo, European carp, eel cat (rare), lake catfish (rare), rock bass, blue-spotted sunfish, long-eared sunfish, pumpkinseed sand-pike, yellow perch, white bass, yellow bass.

Third class.—Paddle-fish, lake sturgeon, shovel-nosed sturgeon, white-nosed sucker, common red-horse, short-headed red-horse, yellow bullhead, common bullhead, black bullhead, little pickerel, warmouth, sheepshead.

Fourth class.—Dogfish, gizzard-shad, river carp, lake carp, spotted sucker, common sucker, burbot.

The distinction of Illinois as a fish-producing state is to be found in its relation to the Mississippi River and some of the most important branches of that stream. The state is traversed diagonally by the Illinois River, admirably adapted by its sluggish current, by the many bottom-land lakes connected with it at low water, by the extensive breeding-grounds afforded to fishes during the period of the spring overflow, and by the vast abundance of fish food in its waters at all seasons of the year, to support an unusually large and varied fish population.

Illinois markets a larger value per annum in fishes taken from flowing streams than all the states immediately surrounding it taken together. Illinois furnishes, indeed, more than one-third of the fishes sent to market from all the streams of the Mississippi Valley. Furthermore, Illinois River and its tributaries produced, in 1899, 72 per cent of all the fishes taken from the streams of the state, and a fourth of the entire fish product of the Mississippi Valley came in that year from this one stream. The totals for the different Illinois stream systems were as follows: Illinois, \$371,110; Mississippi, \$118,278; Wabash, \$38,065; Ohio, \$20,029; Kaskaskia, \$3,002; Big Muddy, \$1,136.

The Great Lakes fisheries in Illinois waters are of insignificant proportions. The total longshore product for Cook and Lake counties during the last census year was \$12,500—about \$2,000 less than the sum derived from our river turtles alone.

The fisheries of the state are of sufficient economic interest to make it the duty of all concerned to preserve them carefully and to take all practicable measures for their improvement and development.¹

TABLE
POUNDS OF COMMERCIAL FISH CAUGHT ON

Station	Carp	Buffalo	Sunfish and Crappies	Bullcat
Henry	453,000	5,000	74,000	12,000
Chillicothe	950,000	80,000	78,000	10,000
Rome	150,000	5,000	75,000	20,000
Peoria	1,412,000	121,500	84,000	56,000
Pekin	1,000,000	60,000	65,000	45,000
Liverpool	422,743	16,776	157,547	88,819
Havana				
Bath				
Browning	378,000	111,300	236,550	51,300
Beardstown	1,034,300	246,200	70,400	180,100
Meredosia				
Naples				
Valley City	66,000	5,000	2,000	
Florence	55,000	3,000	1,200	
Montezuma	20,500	3,500		
Bedford	3,000			
Meppen				
Total	5,944,543	657,276	843,697	463,219

¹ Stephen A. Forbes and Robert E. Richardson, *The Fishes of Illinois*, Natural History Survey of Illinois, Vol. III, 1908.

The accompanying table shows in detail the fish catch in pounds for a single year. The stations are arranged in order from Henry, Marshall County, downstream to Meppen, Calhoun County, a distance of about 200 miles.

Insects.—In addition to the vertebrate animals already mentioned, Illinois is the home of myriads of invertebrates, the most important groups of which are the insects and mollusks.

The insects of the state are of great economic importance because of their relation to field crops, vegetable gardens, flowers, shrubs, and trees. Injurious insects are reduced in number and their ravages greatly lessened by the work of insectivorous birds, predaceous and parasitic insects, and by man. The study of the life-histories of injurious insects and the best methods of combating them is carried on by state and national governments, and the results are widely published.

Among the more injurious insects to Illinois field crops are the chinch bug, Hessian fly, army worm, cut worm, corn-root

I

ILLINOIS RIVER, SEASON OF 1913-14*

Catfish	Dogfish	Perch	Assorted Fish	Total
2,000	10,000	800	.....	544,000
1,000	20,000	.....	.....	1,130,800
12,200	5,000	.....	.....	271,000
.....	55,000	2,000	8,000	1,690,700
3,099	46,870	.....	550,000	1,235,000
.....	.....	.....	2,200,000	1,285,854
.....	.....	.....	700,000	2,200,000
110,800	8,000	3,000	10,000	700,000
.....	20,000	6,600	.....	909,150
.....	.....	.....	.....	1,557,600
.....	.....	.....	34,500	34,500
1,000	.....	500	10,000	84,500
1,000	.....	500	.....	60,700
500	.....	150	.....	24,650
.....	.....	.....	.....	3,000
.....	.....	.....	500,000	500,000
131,599	164,870	13,550	4,012,500	12,231,454

* From Annual Report of the Game and Conservation Commission for 1913-14.

aphis, corn-root worm, and green-oat aphis. Among the garden pests are found the potato beetle, cabbage worm, striped cucumber beetle, squash bug, and aphids. Some of the insects which infest trees are the codling moth, San José scale, tent caterpillar, peach-tree borer, wooly apple aphis, and the tussock moth.

Many insects are of value to man because they destroy injurious insects. These helpful insects are *predaceous* if they eat their prey; *parasitic*, if they live upon the bodies of other insects. Among the predaceous insects are the lady-bird beetles, lace-winged flies, and ground beetles. Some of the important parasitic insects are the braconoid flies, ichneumon flies, and chalcis flies.

Mollusks.—Snails and fresh-water mussels, or "clams," are the chief representatives of the mollusks in Illinois. Mussels are abundant in the principal streams of the state, and "musseling" has been carried on extensively on the Illinois, Mississippi, Ohio, and Wabash rivers. The shells are sold by the ton to button factories; the "meats" make good fertilizers. Pearls are sometimes found in the mussels. When "musseling" was at its height on the Illinois River, large jewelry establishments sent their representatives up and down the river in motor boats to purchase pearls of the fishermen. Prices varied from \$3 for the smaller specimens to more than \$2,500 for the largest and most perfect pearls.

CHAPTER VIII

NATIVE PEOPLE

The Indians.—Prior to the coming of the white man in 1673, the Illinois country had been occupied exclusively by Indian tribes, and the Indians were an important factor in the population of the state until 1833, 160 years after the explorations of Joliet and Marquette, when the Indians ceded their remaining lands to the United States. A primitive race, obtaining its livelihood by means of hunting, fishing, and crude agricultural pursuits, had maintained itself for unknown generations on the resources of the native forests and prairies of Illinois.

From the standpoint of the Indian, who depended mainly on the results of the chase for food and clothing, the Illinois country was fully populated by his people. As seen by the white man, who, for centuries, had obtained his food and clothing by careful cultivation of the soil and rearing of domesticated animals, the Illinois country with its level surface, fertile soil, and favorable climate was capable of supporting many times the population found among the Indian inhabitants.

Density of Indian population.—The number of Indians living in North America, in the United States, or in Illinois prior to the settlement of the white man can be known only through the careful estimates of men who have made a special study of the problem. The following is from the *American Indian* by Elijah M. Haines:

Careful investigation into this subject warrants the assertion that there was not, and has not been, since the time of the discovery of America, within what is now the territory of the United States, nor upon the whole North American continent, 2,000,000 Indian inhabitants.

Concerning the Indian population of New England Mr. W. A. Phelan finds that the total of the Indian population of New England, originally estimated at 70,000, is reduced by close investigation to, at the outside, 13,000 or 14,000.

The report of the Commissioner of Indian Affairs, under date of September 28, 1886, shows the total population of Indians assigned to reservations, exclusive of those in Alaska, to be 247,261, the number of Indians in Alaska being estimated at 20,000. The number of Indians scattered about the country of which the United States have no immediate care or

jurisdiction, and of which no accurate census has been taken, will, perhaps, increase the number of Indians of all descriptions, at present inhabiting the United States, to 300,000. Add to this the Indians of the British possessions and the northern regions, and it will doubtless swell this number of Indians in North America to somewhere about 500,000.

The original estimate of 70,000 Indians for New England, regarded by later investigators as entirely too high, gives a density of but 1 person to the square mile, while the later estimate of 14,000 gives but 1 person to 5 square miles, or 25 square miles per family. New England and Illinois may be considered fairly comparable in their fitness for Indian occupation and development.

The Indian mode of life would not permit a dense population. The contests among the tribes for possession of favorite hunting grounds were frequent and fierce. Tribal boundary lines were shifted back and forth generation after generation during historic times, and such changes had doubtless gone on during earlier centuries. It seems that no area of considerable size in the United States ever supported an Indian population having a density as great as 1 person per square mile.

Indian population in Illinois.—In general, it is estimated that one-fourth of the Indians were counted as warriors. The number of warriors reported for any tribe of Indians was thus a basis for estimating Indian population. The following statements concerning Indian tribes which lived in Illinois are based on Beckwith's work:¹

The several Indian tribes, which from time to time occupied parts of Illinois, were the Miamis, Illinois, Winnebagoes, Sacs and Foxes, Kickapoos, Potawatomies, and, at short intervals, the Shawnees. The Illinois Indians were composed of five subdivisions: Kaskaskias, Cahokias, Tamaroas, Peorias, and Metchigamis.

In 1680, the Indian population of an Indian village near Starved Rock was estimated at 7,000 or 8,000 souls.

The building of Fort St. Louis upon the heights of Starved Rock by La Salle, in 1682, gave confidence to the Illinois who had again returned to their favorite village. They were followed by bands of Weas, Piankashaws, and Miamis, near kinsmen of the Illinois, and by the Shawnees and other tribes of remoter affinity; and soon a cordon of populous towns arose about the fort. The military forces of these villages at the colony of La Salle, in 1684, was estimated at 3,680 fighting men, the Illinois furnishing more than one-third of this number. (If the population were four times the number

¹ Hiram Beckwith, *Illinois and Indiana Indians*.

of warriors the Starved Rock region, according to this estimate, contained nearly 15,000 Indians.)

In an enumeration of Indian tribes made in 1736, the number of warriors of the Illinois Indians are set down as follows: Metchigamis, 250; Kaskaskias, 100; Peorias, 50; Cahokias and Tamaroas, 200. This gives a total of 600 warriors and a population of 2,400.

General William Henry Harrison reported that when he was made governor of Indiana in 1800 that the once powerful Illinois were reduced to 30 warriors, of whom 25 were Kaskaskias, 4 Peorias and a single Metchigamian.



ILLINOIS RIVER AND VALLEY FROM STARVED ROCK STATE PARK

In this scene we are looking down the Illinois River. Within the view, to the right of the river, is the site of the Kaskaskia Indian village visited by Joliet and Marquette in 1673. (Copyright by Keystone View Company.)

The Indian population of Illinois, when admitted as a state in 1818, is set forth in *Illinois in 1818*, as follows:

The best available evidence as to the population of Indian tribes living in Illinois in 1818 is an estimate made by the secretary of war in 1815, but unfortunately the figures refer to the tribes as a whole and not merely to the groups living in Illinois. According to this estimate the Potawatomi were the most numerous, having 4,800 souls. The Sauk numbered 3,200 and the

Fox 1,200, making a total of 4,400 for the two tribes. The Winnebago were credited with 2,400 souls but only a few of these lived south of the boundary line. Nearly all of the 1,600 Kickapoo, on the other hand, were within the limits of Illinois. The Kaskaskia tribe had been reduced to 60 souls and the Peoria were not included in the count at all. In each instance it was estimated that about one-fourth of the members of the tribe were warriors.



STARVED ROCK AS SEEN FROM ILLINOIS RIVER

Starved Rock, now included in a state park, was occupied in the early French days by Fort St. Louis, and numerous Indian tribes lived near.

These numbers give a total of 13,260. After deducting those outside the state, the Indian population of Illinois in 1818 was somewhat less than 12,000, a density of about 1 person to 5 square miles, or one family to 25 square miles for the state as a whole. This population, however, was almost entirely in central and northern Illinois which had not yet been opened for settlement. Southern Illinois, from Madison

County southward, had been surveyed and opened to settlement before 1818, and in this area 40,000 white settlers were counted at the time that Illinois was organized as a state.

Life of the Indian.—The Indian, like all other inhabitants of the earth, spent the greater part of his time and energy in securing food, clothing, and shelter for himself and his family. He was a child of nature, adapting himself to his natural environment in such a manner as to be very largely dependent on nature's supplies, developing a crude agriculture by the labor of the women only as a supplement to the fruits of the chase.

The following from *Illinois in 1818* gives a clear picture of the ordinary activities of the Indians of Illinois:

All these tribes belonged to the Algonkin linguistic group with the exception of the Winnebago, who were of Dakota stock. The material culture, social organization, and religious beliefs of the different tribes were fairly uniform. They were people neither of the forest nor the plain, but lived along the water courses much as did the first white settlers. Their time was divided about equally between hunting and agricultural life. "They leave their villages," says Marston, "as soon as their corn, beans, etc., are ripe and taken care of, and their traders arrive and give out their credits and go to their wintering grounds; it being previously determined on in council what particular ground each party can hunt on. The old men, women, and children embark in canoes, and the young men go by land with their horses; on their arrival they immediately commence their winter's hunt, which lasts about three months. They return to their villages in the month of April, and after putting their lodges in order, commence preparing the ground to receive the seed."

The principal crop was Indian corn, of which they had extensive fields. Speaking of the Sauk and Fox near Rock Island, Major Marston says: "The number of acres cultivated by that part of the two nations who reside at their villages in this vicinity is supposed to be upwards of three hundred. They usually raise from seven to eight thousand bushels of corn, besides beans, pumpkins, melons, etc. The labor of agriculture is confined principally to the women, and this is done altogether with the hoe." While corn formed the staple of the Indians' diet, they made some use of wild vegetables and roots. They ate meat of many varieties, preference being given to venison and bear's meat. They cared little for fish, but ate it when other food was scarce.

The ordinary garments of the Indian men were a shirt reaching almost to the knees, a breechclout, and leggings which came up to the thigh and were fastened to the belt on either side. In earliest times all their clothing was made of leather, but by 1818 this material had been generally replaced by trade cloth. The women wore a two-piece garment, short leggings reaching to the knees, and moccasins; they also employed the customary Indian ornamentation of quills and beads. Both sexes wore the robe, and later the trade blanket. The men painted their faces in various ways, while the women painted very little or not at all.

The principal manufacturing operations of these tribes were tanning, weaving, and the making of pottery; although the last named industry

had practically been given up by 1818. The central Algonkin were not familiar with the loom, but they twisted a twine from the inner bark of the linden, and with this wove excellent bags of various sorts, which they used for a great variety of purposes. These were decorated by weaving in geometric designs and conventional representations of animals. They also made reed mats sewed with twine, which were used as coverings for floors, and as roofing for the winter houses. The pottery was of a rather inferior sort, burned in an open fire, or simply sundried, and decorated with a few incised lines. With the coming of the whites, this native ware was rapidly replaced by the trade kettle.

All the tribes living in Illinois used two types of houses, one for summer, the other for winter. The summer houses as described by Forsyth, were "built in the form of an oblong, a bench on each of the long sides about three feet high and four feet wide, parallel to each other, a door at each end, and a passage through the center of about six feet wide, some of those huts are fifty or sixty feet long and capable of lodging fifty or sixty persons. Their winter lodges are made by driving long poles in the ground in two rows nearly at equal distances from each other, bending the tops so as to overlap, then covering them with mats made of a kind of rushes or flags. A bearskin generally serves for a door, which is suspended at the top and hangs down. When finished, it is not unlike an oven with the fire in the center and the smoke emits through the top."

It is evident that the Indian had nothing that could be called a formal civil government. Most affairs were left to individual initiative; the love of freedom was one of the Indians' chief characteristics; and they suffered their personal liberty to be only slightly limited even by the authority of the chiefs and sachems.

In 1818, the Indians retained but little of the independence and self-sufficiency of their forefathers. Their agriculture was of a rude and primitive sort, and they had come to rely upon the white trader for a large number of articles which, once unknown, had become necessities of life; and these they secured in exchange for the returns of their hunts.

The Indians leave Illinois.—The first government land sales in Illinois took place in 1814. Southern Illinois was first opened to settlement. Central and northern Illinois were opened soon after statehood was attained, and by 1833 all Indian tribes had ceded their Illinois lands to the United States and agreed to removal to lands west of the Mississippi. Thus in 160 years from the first appearance of the white man in Illinois, the land of the state had passed from the exclusive ownership of the Indians into the permanent possession of another race.

CHAPTER IX

THE COMING OF THE WHITE MAN

Indian and white man.—It seems certain that the fertile and productive Illinois country of 56,000 square miles never supported an Indian population having a density as great as 1 person per square mile, and that at times the population did not exceed 1 person to 3 or 4 square miles. In 1673 Joliet and Marquette, the first white men known to the Indians of Illinois, crossed the state along the valleys of the Illinois, Des Plaines, and Chicago rivers. By 1833, 160 years after this first visit, the white man had induced the Indian to relinquish his claim to the last square mile of Illinois and to remove to more western lands. The United States census of 1830 showed that 157,445 white people, or 3 per square mile, had already made their homes in the state; by 1910 this number had increased to 5,638,591, or 100 persons per square mile.

The procession of the white man into the Illinois country was continuous and rapid. Various stages marked the process of taking possession of the land. The explorer was followed by the fur-trader; then came the "hunter pioneer," who competed directly with the Indian for occupation of the land. He was followed by the "first settler," who depended somewhat more on agriculture than did the hunter pioneer. The "permanent settler" then came to improve the land and to establish a home for his own and succeeding generations.

The explorers.—A land of such bountiful natural resources as Illinois, adapted to the support of a numerous and prosperous population, could not remain unknown to civilization after the fact of its existence had been established. The routes of the early explorers were determined by geographic conditions. With waterways as the ready-made roads of travel, it was but natural that early expeditions for discovery and exploration should carry Joliet and Marquette along the Illinois country down the Mississippi, and across the level plains of the state up the easily navigated Illinois River,

along the Des Plaines, the Chicago portage, and the Chicago River to Lake Michigan. It was the shores of Lake Michigan and the courses of the St. Joseph and Kankakee rivers that directed the route of La Salle, late in 1679, across Michigan and Indiana into the Illinois country. During the next few years La Salle and his men made numerous trips across Illinois, but always along the most easily traveled route—the Illinois Valley and easy portages to Lake Michigan. As long as the white man was only an explorer, he changed the Indian's mode of life but little.

The fur trade.—When the explorer became a fur-trader, as did La Salle and his companions, the white man's influence on the daily life of the Indian became distinctly noticeable. The trade kettle soon displaced the crude Indian pottery. The trade blanket and trade cloth were substituted for much of the fur clothing. Glass beads were eagerly sought as ornaments. The white man's gun and ammunition took the place of bow and arrow. Whiskey was eagerly sought and used with deadly effect. All articles of commerce were to be paid for in peltry. The introduction of firearms and the steady demand for furs led to greater destruction of animal life than was possible under the natural conditions prior to the coming of the fur-trader. The balance which had been developed and maintained in previous generations was being unsettled by the fur-trader; it was further disturbed by the hunter pioneer, and entirely overthrown by the coming of the permanent settler. The principal regions of fur-trading activity were the valleys of the Mississippi, Illinois, and Wabash rivers.

With increased knowledge of the Illinois country as a fur-producing region, fur-traders multiplied in numbers until the state was well supplied with trading posts.

It is difficult for the present inhabitants to realize the extent to which wild game once abounded in the state, and the enormous quantities of peltry which were annually exported. The valley of the Illinois River was, at the close of the territorial period, one of the important fur bearing areas of the northwest. In 1816, the furs sent out from the various posts upon the Illinois River included 10,000 deer; 300 bear; 10,000 raccoons; 35,000 muskrat; 400 otter; 300 pounds of beaver; 500 cat and fox; and 100 mink. The total value of this peltry was estimated at \$23,700. The merchandise imported into the region during the same year was estimated to be worth more than \$18,000. In considering the Illinois fur trade, it should be remembered that it constituted only one part of an industry of enormous

proportions, covering the Great Lakes region, and extending westward far beyond the Mississippi, an industry which at one time or another has made its influence felt in almost every part of the North American continent.¹

Illinois lands opened to settlement.—Had the era of the fur-trader been continuous, Illinois would have remained clothed with its native vegetation, inhabited by its native animals and its native peoples, and the chief articles of export would still be furs instead of corn and live stock. But no region of the earth as favorably situated as Illinois can remain in a state of nature, supporting a mere handful of people. The inhabitants of more densely populated regions inevitably move into such lands, introduce agriculture, and obtain a good living for a population many times the number of the original occupants.

The Illinois region passed from hunting lands to farm lands very slowly for more than a century after its discovery; then with exceeding rapidity the transformation of the state from hunting grounds to cultivated fields was completed. During this pioneer period, thousands of eager, industrious people from all parts of America and Europe came to Illinois to find homes, till farms, build cities, and develop a worthy civilization. By 1833 the national government had secured title from the Indians to all the lands of the state; by 1860 the pioneer period had passed and the lands of Illinois were fully occupied, ready for a long period of continuous development and progress.

The earliest French settlements in Illinois were made about the year 1700 at Cahokia in St. Clair County and at Kaskaskia in Randolph County. In 1722 Prairie du Rocher in Randolph County was also founded by the French. About 1800, Shawneetown in Gallatin County was first settled.

In a hundred years, 1700 to 1800, the white population of the state had reached only 2,458; the population of 1810 was 12,282, a gain of 400 per cent in ten years, and up to this date no public lands had been placed on sale by the national government. Under a system of land tenure whereby the public lands are to pass into the hands of individuals for private and permanent ownership and occupation, the would-be

¹ Solon J. Buck, *Illinois in 1818*.

owners must await the action of the government. Thus Illinois remained practically an Indian country until the land was surveyed and officially opened to settlement.

The survey of Illinois was authorized in 1804. The second, third, and fourth principal meridians and their base lines were established. Locating main township lines was begun in 1804, but detail work in the townships was not taken up until about 1810. Sales of public lands in Illinois were first made in 1814. When Illinois was admitted as a state in 1818, southern Illinois had been surveyed and opened to settlement. The survey is described as follows in *Illinois in 1818*:

The frontier of government survey then, in 1818, started on the Mississippi near Alton and ran east to the third principal meridian, then south thirty miles to the base line, east again to the southeast corner of the Vincennes tract and then northeastwardly along the boundaries of that tract and the Harrison purchase to the Indiana line near the boundary between the present Vermilion and Edgar counties.

The map facing page 52 in *Illinois in 1818* shows the extent of this survey. North of this frontier line of government survey of 1818, some lands were still held by the Indians, some had been ceded by the Indians to the federal government, and the "military tract" between the Illinois and Mississippi rivers had been surveyed and opened to allotment under the law in October, 1817. The "military tracts" consisted of 6,000,000 acres of public lands in Michigan, Illinois, and Missouri, set aside by Congress at the beginning of the War of 1812 to satisfy the bounties of 160 acres promised to each soldier. The "military tract" of Illinois included 3,500,000 acres, or one-tenth of the state. It extended northward from the junction of the Illinois and Mississippi rivers to an east-west line drawn from the junction of the Vermilion and Illinois rivers at La Salle due west to the Mississippi River between Rock Island and Mercer counties. No important settlements in the military tract were possible in the few months that elapsed between its opening in October, 1817, and the movement for statehood. After statehood was attained, the public lands of the entire state were rapidly made available for settlement. The opening of the Erie Canal and the development of steamboat traffic on the Great Lakes brought an ever-increasing stream of immigrants into the northern and central parts of the state.

The pioneer.—The frontier line during American settlement may be considered as the line separating regions having a density of population of more than 2 persons per square mile from regions having less than 2 per square mile. The hunter pioneer usually crossed the frontier line and lived much as did the Indian. As the frontier line approached his home in the solitude, he moved westward. The first settler lived along the frontier line, and, as a denser population of permanent settlers approached, he sold his belongings and moved westward.

A clear picture of pioneer life in Illinois is developed in *Illinois in 1818* in the chapter "The Pioneers." The writer draws largely from the descriptions written by the early inhabitants themselves. Space permits only an abstract of the more salient facts:

Fordham divided the people of the frontier into four classes. To the first two of these classes belonged the bulk of the pioneers.

The first class consists of the *hunters*, a daring, hardy race of men who live in miserable cabins which they fortify in time of war with the Indians whom they hate, but much resemble in dress and manners. They are unpolished, but hospitable, kind to strangers, honest, and trustworthy. They raise a little Indian corn, pumpkins, hogs, and sometimes have a cow or two, and two or three horses belonging to each family, but their rifle is their chief means of support. They are the best marksmen in the world, and such is their dexterity that they will shoot an apple off the head of a companion. Their wars with the Indians have made them vindictive. This class cannot be called first settlers, for they move every year or two.

The second class may be called *first settlers*, a mixed set of hunters and farmers. They possess more property and comforts than the first class. They follow the range pretty much; selling out when the country begins to be well settled and their cattle cannot be entirely kept in the woods. These original backwoodsmen look upon all new-comers as obtruders. The old hunters' rule is: when you hear the sound of a neighbor's gun, it is time to move away. These men live in solitude and rely on their own efforts to support themselves and their families. They derived their means of livelihood principally from hunting, and devoted very little attention to farming. Some, however, follow a different destiny. Their little corn patch increases to a field, their first shanty to a small log house, which, in turn, gives place to a double cabin in which the loom and spinning wheel are installed. A well and a few fruit trees after a time complete the improvement.

The third class consisted of men of influence in their communities. They were usually fairly well educated and possessed of a moderate amount of property. They came from Kentucky, Tennessee, Indiana, from the Southern, Middle Atlantic, and the New England States. This class consisted of young doctors, lawyers, storekeepers, farmers, and mechanics. Many of them lived in or near one of the land office towns, Kaskaskia, Shawneetown, or Edwardsville, but a few were to be found in the smaller settlements.

The fourth class is not clearly distinguishable from the third. It consisted of old settlers, rich, independent farmers, wealthy merchants, possessing a good deal of information, a knowledge of the world, and an enterprising spirit. They undertake any business or speculation that promises great profit.

An English pioneer settlement.—Only a region of superior qualities favorable for home-making could have drawn people from the distant regions of the earth as did Illinois. Probably the most conspicuous example of the attractiveness of Illinois to the home seeker is found in the English settlement at Albion, Edwards County. The following abstract is from *Illinois in 1818*:

George Flower and Morris Birbeck, men of education and means, planned the enterprise, selected the site, directed the emigration, and established the settlement. Flower had come to the United States in 1816, Birbeck in 1817. They decided to locate in Pennsylvania, Ohio, Indiana, or Illinois. They did not wish to go farther north because of the severity of the climate, nor farther south because of their abhorrence of slavery. The rough conditions of the frontier did not appeal to them, but the opportunity to purchase land in unlimited quantities at a low price appealed to them very much.

While traveling in Kentucky, Flower heard of the prairies of southern Illinois. He and Birbeck visited Edwards County in 1817 and decided to locate their settlement on the small prairies and adjoining wooded tracts. Their first purchase was of 3,000 acres; during the next year they entered 26,400 acres; additional purchases were made later.

Birbeck remained in America and Flower returned to England to find emigrants. In 1818 about 90 persons sailed. In April Flower left England on a chartered ship with 60 emigrants. They brought with them a goodly number of cows, hogs, and sheep of the choicest breeds of England.

This English settlement, induced by the advantages of the Illinois prairies, exerted an important influence on the pioneer life of Illinois. The leaders were well instructed in the theory and practice of agriculture. They were among the first settlers of Illinois to attack the problem of bringing the prairie under cultivation. The blooded stock which they introduced was a valuable asset to the community. Nearly all the foreign travelers who made tours of the United States during the years 1818 to 1820 visited the settlement and published accounts of it in their books. This English pioneer settlement thus gave to Illinois unlimited advertising, not only in England, but on the continent and in the United States as well. This undoubtedly helped to promote emigration both from abroad and from the eastern states.

Population of 1818.—The table on page 142 shows how sparsely populated the state was at the time of its admission to the Union.

The table includes only the white population of that part of the state which had been surveyed. Crawford, Bond, and Madison counties included small areas of surveyed lands in their

southern borders, and about 43,000 square miles additional, consisting of the recently surveyed lands of the "military tract" and the unsurveyed lands of the state. The returns of the census of 1818 showed a population beyond the line of survey sufficient to bring the total for the state to 40,000, which was the number required for statehood by the terms of the Enabling Act. Thus at the time of admission to the Union, Illinois had a population density of but 3 per square

TABLE I
AREA AND POPULATION OF COUNTIES, 1818

County	Total Area (sq. mi.)	Area Surveyed (sq. mi.)	Population	Density (sq. mi.)
Crawford.....	21,522	700	2,946	4
Edwards.....	2,475	2,475	2,243	1
White.....	1,150	1,150	3,832	3
Gallatin.....	800	800	3,951	5
Pope.....	600	600	2,069	3
Johnson.....	400	400	767	2
Franklin.....	860	860	1,228	1
Union.....	800	800	2,709	3
Jackson.....	730	730	1,619	2
Randolph.....	875	875	2,974	3
Monroe.....	340	340	1,517	5
St. Clair.....	725	725	5,039	7
Washington.....	900	900	1,819	2
Madison.....	17,535	570	4,500	8
Bond.....	6,288	432	1,398	3
Total.....	56,000	12,357	38,611	3

mile in the region open to settlement, and less than 1 per square mile for the state as a whole. Only a region of remarkable promise could have attracted a population of 6,000,000 in a single century.

The distribution of this early population was determined largely by natural conditions. The waterways were the easiest routes of travel. Timber for buildings and for fuel and water for domestic use were easily obtained near the streams. Game abounded in the forest, and agriculture was readily developed on the small prairies or cleared forest land. A population of about 15,000 was found in an area of 2,000

square miles between the Mississippi River on the west and Kaskaskia River and Shoal Creek on the east. Along the Wabash River from the Indiana state line to Saline River in

TABLE II
NATIVITY OF ILLINOIS PIONEERS, 1818

	Number by States	Number by Groups of States	Percentage
Southern States			
Virginia.....	94		
North Carolina.....	84		
South Carolina.....	40	273	38
Georgia.....	29		
Maryland.....	26		
Western States			
Kentucky.....	150		
Tennessee.....	82		
Ohio.....	23	267	37
Indiana.....	9		
Illinois.....	3		
Middle Atlantic States.....			
Pennsylvania.....	47		
New York.....	36		
New Jersey.....	6	91	13
Delaware.....	2		
New England States			
Massachusetts.....	6		
Vermont.....	6		
Connecticut.....	3	19	3
New Hampshire.....	3		
Rhode Island.....	1		
Foreign Countries			
England.....	40		
Ireland.....	10		
Germany.....	5	66	9
Canada.....	5		
France.....	4		
Scotland.....	2		
Total.....		716	100

Gallatin County, in a strip of territory about 15 miles wide and more than 100 miles in length, lived a population of 12,000 on an area of 1,500 square miles. These two centers of

population had a density of about 8 per square mile. Only 12,000 inhabitants were found in the remaining 8,000 square miles of surveyed lands, a density of less than 2 per square mile.

Professor Buck has traced the birthplace or former residence of 716 heads of families who resided in Illinois when the census of 1818 was taken (Table II). These are about 12 per cent of the 6,020 families then living in Illinois. The summary includes birthplace, or the earliest known residence if the birthplace could not be determined from the records. Another classification is shown in Table III:

TABLE III

	Number by Regions	Percentage
From south of Ohio River and Mason and Dixon's line.....	505	71
From northern states, including Illinois.....	145	20
From foreign countries.....	66	9
Total.....	716	100

Since the population had nearly all moved into the state after 1800, the attractions of the Illinois country must have been widely known to have drawn, in so short a period, a population whose former homes had been in 18 other states and 6 foreign countries.

Settlement of central and northern Illinois.—When Illinois was admitted to the Union, Indian claims had been extinguished for less than half the state. These lands lay in two detached areas, one in the southern third of the state and the other to the north and west of the Illinois River. Indian claims overlapped in many cases and the same territory was involved in more than one Indian treaty. The Piankashaw had ceded the last of their claims in Illinois in 1805, the Sac and Fox in 1815, and the Illinois in 1818. These cessions had been completed before Illinois was admitted as a state. The Kickapoo made final cession of Illinois land in 1819, the Winnebago in 1829, and the Potawatomi in 1833.

After government ownership had been established, the regions of the state were rapidly surveyed into townships,

sections, and quarter-sections, and opened to entry. The frontier line of settlement moved steadily northward, more rapidly along the streams and forested belts than in the prairie regions. This movement of an incoming population is well described in the *Geography of the Middle Illinois Valley*:

In 1820 population was confined to the southern portion of the state. During the next few years settlement spread northward into the

Sangamon region. In 1823, Springfield was a frontier village containing a dozen log cabins; the site of Peoria was occupied by a few families, and that of Chicago by a military and trading post. The rest of northern Illinois was entirely unoccupied. In the latter part of the twenties, the Sangamon country filled rapidly, one hundred wagons in a single train being frequently seen on their way there. A new impetus was given to the movements by the establishment of stream navigation on the Illinois River in 1828. By 1830 the Sangamon district was overflowing into the Illinois Valley, which contained a few settlers well beyond Peoria.

In 1832 the southern advance along the Illinois Valley was checked, and, save at Peoria, the settlers were driven south and east of the river by Black Hawk's War. Before the southern frontier had recovered from this blow, a great northern stream of immigration from New York and New England



LORADO TAFT'S FAMOUS STATUE "BLACK HAWK"
AT OREGON

swept into the unoccupied portions of the valley, occupying first the woodland, and later the prairie.

In the decade 1820-30, an expansion started up actively from New England that was destined to become a movement of great proportions later. Before the opening of the Erie Canal, the journey from New England to the West had been slow, difficult, and expensive. The Erie Canal promptly became the most important route to Lake Erie in 1825. There were still, however, few vessels upon the lower lakes, and none regularly upon the upper, so that various courses were followed from Lake Erie to

the Illinois Valley. Navigation was late in developing upon Lake Michigan, and not until 1834 could emigrants count with certainty upon transportation to Chicago.

A flood of settlers now poured into the Illinois Valley and the northern part of the state generally. In 1845 the steamboats alone landed 20,244 passengers at Chicago. Chicago was the gateway to the Illinois Valley. From a "little mushroom town" in 1833, and a "dirty village of twenty hamlets" in 1834 it grew to a population of 4,479 in 1840, and 28,269 in 1850. The value of its imports rose 523 per cent in the ten years following 1836.

One of the greatest problems facing the pioneer was the transportation of his produce to a market. The Illinois River was the only connection with the outside world until the appearance of the railroad, unless the journey was made by wagon to Chicago. In general, therefore, the earlier settlers located near the Illinois or one of its navigable tributaries.

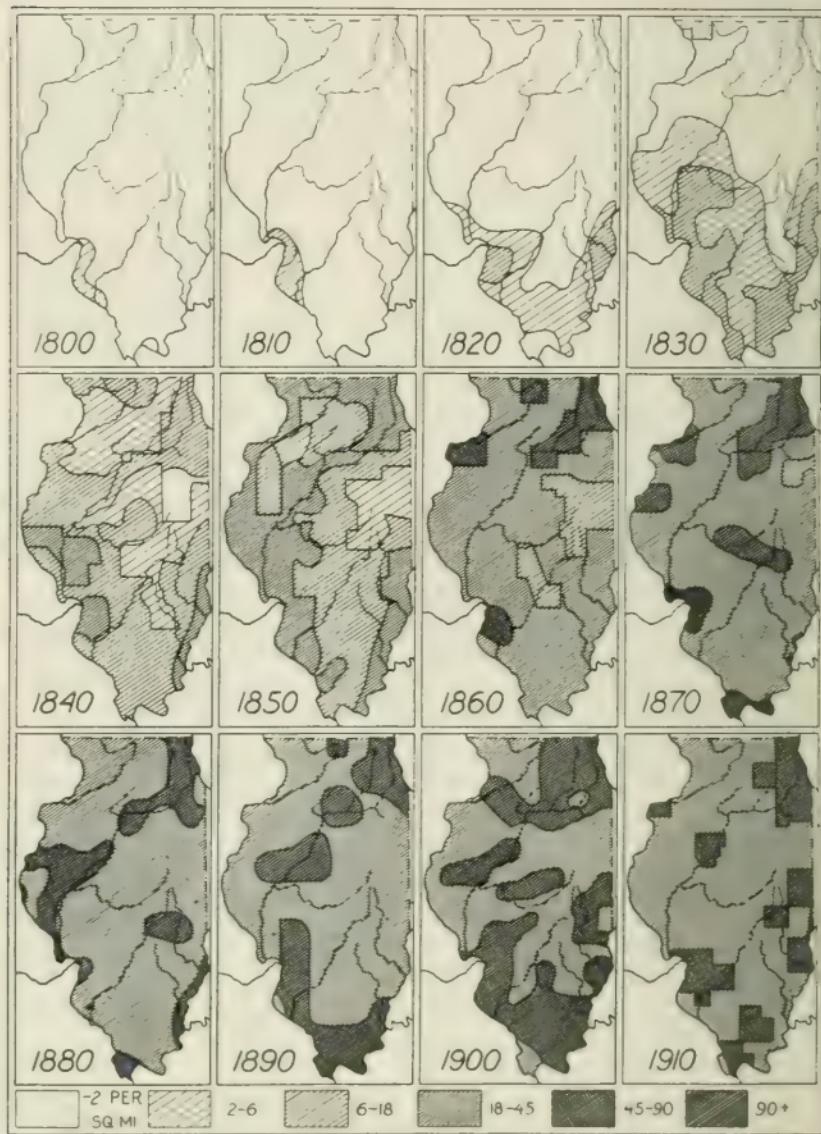
The prairies of Illinois aroused the wonder of all early travelers. They were generally shunned by the first comers for several reasons : (1) Absence of trees was thought to mean that they were infertile. (2) Timber was imperatively needed for buildings, fences, and fuel. (3) They did not afford running water for stock or mills, while lack of fuel left steam mills out of the question. (4) There was no protection from the bitter winds of winter, which, above all else, made that season disagreeable. Men and cattle had even been known to perish in storms on the open prairie. (5) To the farmer, the prairies with their tough sod and matted roots constituted a new and altogether unknown problem.

With the growth of population all the woodland was presently occupied, and new comers were crowded out upon the prairie. The small prairies were presently encircled by a belt of farms. Later, another ring was established inside of the first, and farther out on the prairie, and by a continuation of the process the entire prairie was finally occupied.

Saw mills and grist mills constituted a pressing need of the settlers, and were among the first improvements made. It was a great inconvenience and hardship to be forced to pound grain on a hominy block, or to grind it in hand mills. The first grist mill in Bureau County was built on East Bureau Creek, in 1830; the machinery was largely of wood, and the mill stones were dressed from glacial boulders taken from the neighboring bluffs. The following year the first saw mill of the country was erected on Big Bureau Creek.

A new and powerful factor in the economic life of the Illinois Valley appeared in 1848 in the form of the Illinois and Michigan Canal. The canal opened new markets, brought the valley into closer relations with Chicago and the Great Lakes, and modified its life in important ways. Lumber was the most important article brought into the Illinois Valley through the canal. The cost of lumber was immediately reduced one-half at Peoria, and further reductions soon followed.

The year 1855 has been taken as marking the close of the period of steamboat supremacy in the trade of the Illinois Valley. This decline in water traffic was brought about primarily by the competition of the railroads. The great prairies still remained largely unoccupied in 1850. The problems of transportation and of markets still prevented their occupation. During the decade 1850 to 1860, however, their conquest was rapidly accomplished, and in the latter year the Grand Prairie had everywhere a population of over 6 to the square mile, and the great prairie to the north of the Illinois River more than 18 per square mile. The population of the state as a whole increased over 100 per cent in the ten years.



POPULATION DENSITY IN SUCCESSIVE YEARS

This series of maps shows the steady and rapid growth of Illinois in population for more than a century. The 1910 map is drawn on county lines while previous maps show regions of population without reference to county lines.

The first white man saw the Illinois country in 1673. In 1818, 145 years later, there was a population of 40,000 in the state; 15 years after this date, in 1833, the white man's government had obtained ownership, by treaties with the Indians, to every square mile of Illinois lands; during the short space of another 27 years the frontier line of settlement was swept out of the state, and the year 1860 finds the lands of Illinois occupied by an industrious and prosperous population of 1,711,951.

The foregoing maps indicate the density of population at each decennial census from 1820 to 1860. They show the early influences of the streams and forests on population; the impetus to settlement given by the Illinois and Michigan Canal; and the rapid completion of the pioneer period during the first decade of extensive railroad development.

The accompanying table shows the rapid growth in population of the state as recorded by the United States Census reports.

TABLE IV
POPULATION OF ILLINOIS AND UNITED STATES

DATE	POPULATION OF ILLINOIS	INCREASE		POPULATION OF UNITED STATES	PERCENT- AGE OF UNITED STATES IN ILLINOIS
		Number	Percentage		
1790.....	.....	.....	.....	3,929,214	.....
1800.....	2,458	.....	.....	5,308,483	.04
1810.....	12,282	9,724	395	7,239,881	.17
1820.....	55,162	42,880	349	9,633,822	.57
1830.....	157,445	102,283	185	12,866,020	1.2
1840.....	476,183	318,738	202	17,069,453	2.8
1850.....	851,470	375,287	78	23,191,876	3.6
1860.....	1,711,951	860,481	101	31,443,321	5.4
1870.....	2,539,891	827,940	48	38,558,371	6.5
1880.....	3,077,871	537,980	21	50,155,782	6.1
1890.....	3,826,351	748,480	24	62,622,250	6.1
1900.....	4,821,550	995,199	26	76,303,387	6.3
1910.....	5,638,591	817,041	17	91,972,266	6.1
1920.....	6,485,098	846,507	15	105,683,108	6.1

CHAPTER X

THE SOIL AND ITS CONSERVATION

Importance of soil.—*The wealth of Illinois is in her soil and her strength lies in its intelligent development.*—Draper.

These significant words, carved on the walls of the building of the State College of Agriculture, at Urbana, are a striking expression of the importance of Illinois soils. The development, progress, and prosperity of the state as a whole depend on the proper use and care of that thin stratum of the earth's crust, only a few inches in thickness, known as the *soil*. If this thin outer layer of land were entirely removed from the state, the plant, animal, and human life of today would disappear. If, by careless cultivation and wasteful methods, this soil cover is gradually depleted of its life-sustaining properties, the removal of this greatest of our resources is going on as certainly as if accomplished suddenly and completely. If, on the other hand, a scientific system of permanent agriculture is established promptly, this invaluable gift of nature may be retained, not only in its present high state of fertility, but it may be returned to its original productiveness and maintained as one of the world's most fertile regions for all time. In considerable areas of the state the original soil may, at relatively small expense, be so improved that the returns will be increased many fold.

Population and soil.—In Illinois, as elsewhere in the world, the people are dependent directly on the products of the soil for sustenance. This is just as true of the people in the over-crowded districts of Chicago, many of whose children have never seen a field of growing crops, as it is of the strictly agricultural districts of the state where the boys and girls do their share in the production of staple crops. All the people of the state are wholly dependent for their food and clothing on the soil of Illinois and other regions. No large population can be maintained apart from the products of the earth secured through the intelligent practice of agriculture.

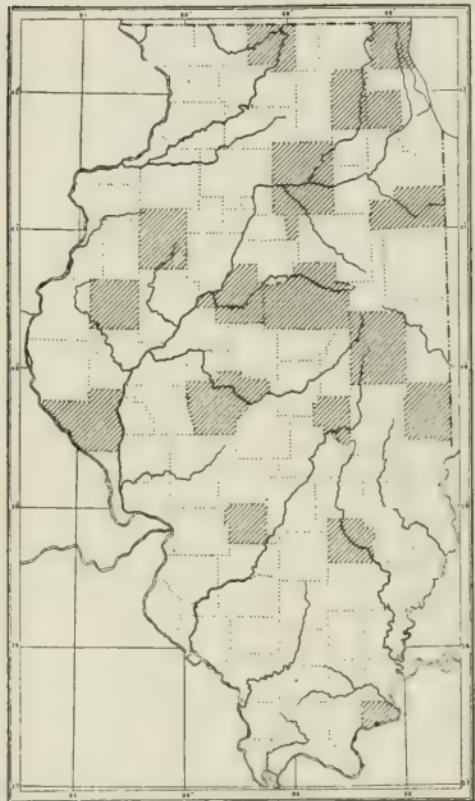
More than 60 per cent of the population of the world live on less than 8 per cent of the land area of the world, not from choice, merely, but from necessity, a necessity based wholly on the productiveness of the soil. The average density of population on this small percentage of the land of the world exceeds 200 persons per square mile, giving an average area of not more than 16 acres per family. The land of Illinois has larger capacity for production than the more densely populated old-world countries. The Illinois lands passed from a state of nature into private ownership for agricultural purposes within the short period of 60 years, 1800 to 1860. In 110 years, 1800 to 1910, the population of civilized men in Illinois was multiplied by more than 2,200. The population during this period increased from 1 person to 22 square miles, or 3 townships per family, to 100 persons to 1 square mile, or an average of 32 acres per family. This unparalleled increase of population was due primarily to soil fertility which, as time went on, was combined with remarkable commercial opportunities and valuable mineral resources, especially coal, the basis of modern industrial development.

The census returns for 1920 show that Illinois now supports a population of 116 persons per square mile, giving, on an average, 28 acres per family.

Illinois has attracted this large population in the short space of three generations of mankind. The fathers and grandfathers of those now living were the original settlers of Illinois woodland and prairie. In the course of time, Illinois, with its wealth of fertile soil, busy factories, and numerous mines, is sure to be populated as densely as the average of the well-developed old-world regions. This larger population can maintain a high standard of living only if the present and succeeding generations pass on the soil to their successors with unimpaired, and, in many cases, with improved fertility.

Soil surveys.—Soil may be “surveyed” from different points of view. The early pioneer looked out over the broad prairies and extensive woodlands of Illinois, and from the general appearance of the landscape selected a future home. If he appreciated the possibilities of future land values he acquired title to large tracts, sometimes thousands of acres in

extent. The eastern farmer who sold his improved holdings at good values came to Illinois while lands were still cheap and made sufficient examination of the soil and its crops to convince him that the new farm was obtained at a favorable price.



MAP SHOWING COUNTIES WITH
SOIL REPORTS

County soil reports have been issued for counties within all the larger soil types. Publication will continue until each county has its own report. The soil maps in these reports are worthy of most careful study.

constantly carried on, solving problems, and adding much to our knowledge of the soil.

These scientific surveys are carried on by soil experts who inspect every ten-acre area, and enter on maps, while in the field, the areas covered by each soil type. Each surveyor

After years of heavy cropping on soils of exceeding fertility, the farmer became convinced that what was once considered a soil of inexhaustible fertility was producing, even under improved methods of cultivation, smaller acre yields than were obtained from the virgin soil. This led to the inauguration of the scientific soil survey of Illinois. A general soil survey of the state was first made and a map prepared showing fourteen soil areas. Detailed county surveys have been made for a number of counties, and these will be continued until the detailed survey of all the counties is completed.

In the Illinois Experiment Station at Urbana many laboratory experiments on soils are being

carries a small auger 40 inches in length with which to obtain soil samples to the depth of 40 inches. The *surface soil* is sampled to a depth of $6\frac{2}{3}$ inches. Next, the *subsurface soil* is sampled to a depth of $6\frac{2}{3}$ to 20 inches. Below this the *subsoil* is sampled to a depth of 20 to 40 inches. Thus the



POT CULTURE LABORATORY FOR INVESTIGATIONS IN SOIL FERTILITY,
UNIVERSITY OF ILLINOIS, URBANA

Laboratory experiments with various soil types brought from different parts of the state form an important part of the work of the Experiment Station, and give a basis for field practice. (Copyright by Keystone View Company.)

thickness assigned to the surface soil is one-half that of the subsurface soil; and the combined thickness of the surface and subsurface strata is equal to the thickness of the subsoil. These samples, carefully analyzed at the laboratories of the

Experiment Station, give accurate, scientific knowledge of the plant-food elements in each soil type.

The soil-survey map shows the fourteen soil *areas* of the state. These are readily located on the map. They are briefly mentioned in chapter iii, "The Glacial Period." A soil *area* may contain a number of *types* of soils. The Experiment Station has defined the different general groups of soil *types* as follows:

Peat—Consisting of 35 per cent or more of organic matter, sometimes mixed with more or less sand or silt.

Peaty loams—Soils with 15 to 35 per cent of organic matter mixed with much sand. Some silt and a little clay may be present.

Mucks—Soils with 15 to 25 per cent of partly decomposed organic matter mixed with much clay and silt.

Clays—Soils with more than 25 per cent of clay, usually mixed with much silt.

Clay loams—Soils with from 15 to 25 per cent of clay, usually mixed with much silt and some sand.

Loams—Soils with from 30 to 50 per cent of sand mixed with much silt and a little clay.

Sandy loams—Soils with from 50 to 75 per cent of sand.

Fine sandy loams—Soils with from 50 to 75 per cent of fine sand mixed with much silt and a little clay.

Sands—Soils with more than 75 per cent of sand.

Gravelly loams—Soils with 25 to 50 per cent of gravel with much sand and some silt.

Gravels—Soils with more than 50 per cent of gravel and much sand.

Stony loams—Soils containing a considerable number of stones over one inch in diameter.

Rock outcrop—Usually ledges of rock having no direct agricultural value.

More or less organic matter is found in all the foregoing groups.

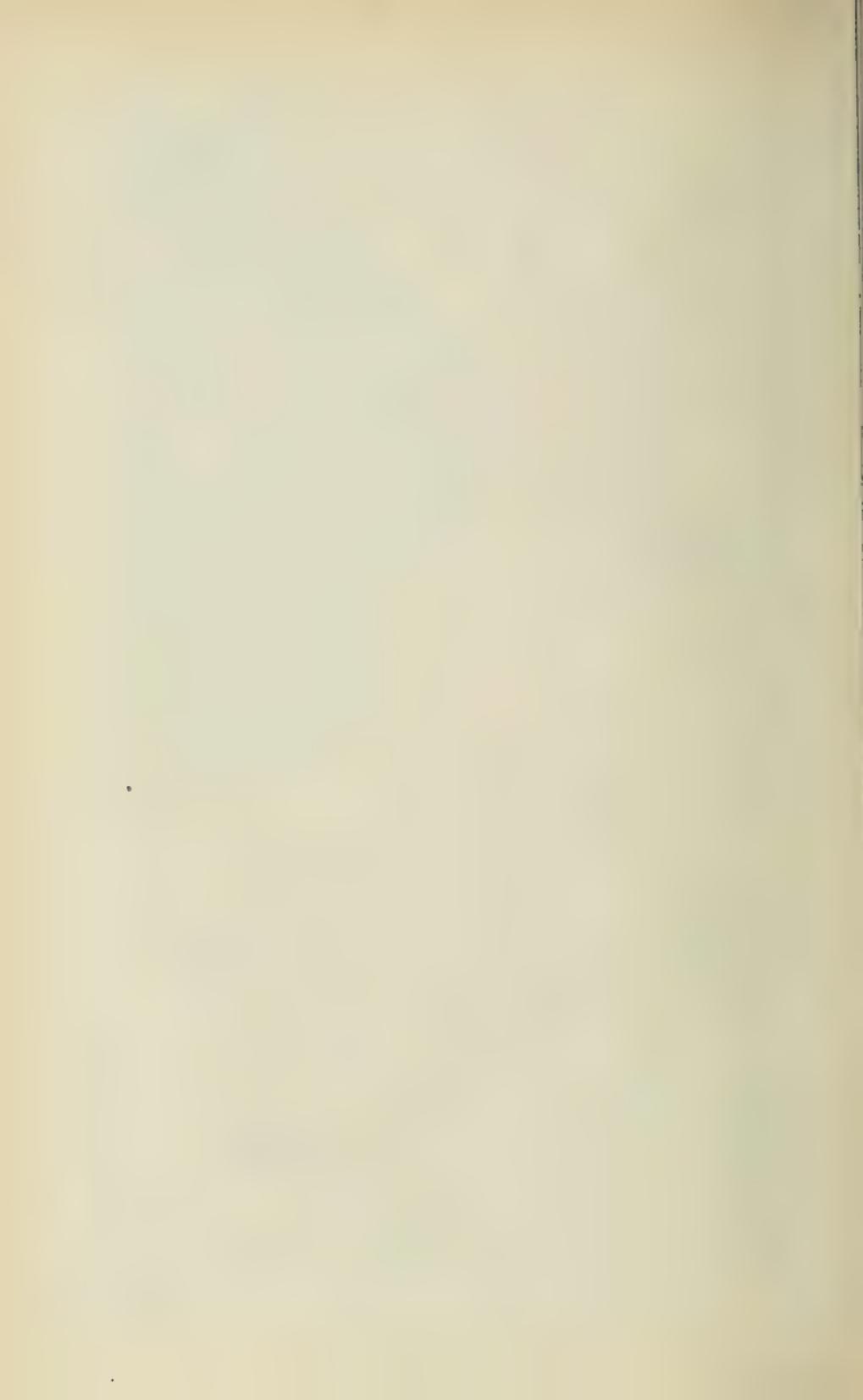
Required plant food.—Ten different chemical elements are required for plant growth. These are: carbon, hydrogen, oxygen; sulphur, iron; magnesium, calcium; nitrogen, phosphorus, potassium. If any one of these elements is not available, the plant fails to develop. With all present in proper proportions, and under favorable climatic conditions, a large crop is assured. The problem of a permanent and profitable agriculture in Illinois, therefore, is the problem of maintaining soil fertility so that these ten elements of plant food shall always be available for the production of maximum crops year after year throughout the centuries.

Carbon, hydrogen, and oxygen come from air and water in unlimited amounts except in times of drought. These three

GENERAL SURVEY
SOIL MAP
OF
ILLINOIS



SOIL MAP OF ILLINOIS



elements constitute about 95 per cent of the weight of the mature crop.

The seven remaining elements, constituting but 5 per cent of the crop, are obtained from the soil. Two of these, sulphur and iron, are required in such small amounts, and they are present in nearly all soils in such large amounts, that they need not be considered of importance in maintaining soil fertility.

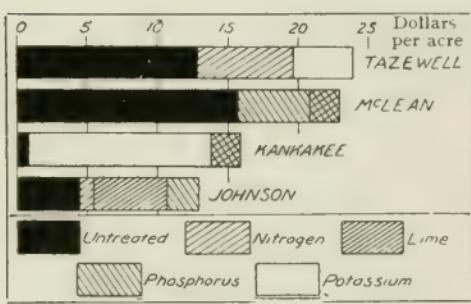
Two others, magnesium and calcium, are so abundant in Illinois limestones that their supply at moderate cost is assured for all time. Special application of ground rock for magnesium is rarely necessary. Large quantities of ground limestone are used annually on Illinois soils, and greatly increased crop yields are thereby obtained. It is especially necessary where the soil is "sour" or acid. The limestone is required much more for the purpose of correcting the acidity of the soil than as a plant food. Since it does play so large a part in crop yields, however, it is to be considered as one of the important elements of plant requirements which must have the intelligent attention of the farmer.

The three remaining elements, nitrogen, phosphorus, and potassium, are required in considerable quantities by all crops, while in most soils the supply of one or more of them is limited. If the supply of one of these elements is too limited, it must, as a consequence, limit the yield of the crop, even though all other factors essential to crop production are well provided.

The actual condition is illustrated by the following examples: The sand-ridge soil of Tazewell County produced, without soil treatment, crops valued at \$12.90 per acre per year as the average for six years; with nitrogen added the yields were valued at \$19.51 per acre per year; additions of potassium with the nitrogen increased the yield to \$23.53 per acre per year. The prairie soil of McLean County yielded, without soil treatment, crops valued at \$15.83 per acre per year; with phosphorus added the yields were valued at \$20.73 per acre per year; additions of nitrogen and potassium with the phosphorus increased the yield to \$22.77 per acre per year. The peaty swamp lands of Kankakee County yielded, without soil treatment, crops valued at 70 cents per acre per year; with potassium added the yields were valued at \$13.89 per acre

per year; additions of nitrogen and phosphorus with the potassium gave yields valued at \$15.44 per acre per year. The yellow silt loam hill land of the unglaciated area in Johnson County produced, without soil treatment, crops valued at \$4.19 per acre per year; with legumes added, \$5.12 per acre per year; with legumes and lime, \$10.41 per acre per year; and with legumes, lime, and phosphorus, \$12.62 per acre per year. These values are all based on prices which were extremely low as compared with the war-time prices of 1918.

These illustrations, based on actual field experiments, show conclusively that the sand-ridge soil is especially deficient in nitrogen, the prairie soil in phosphorus, the peaty soil in potassium, and the unglaciated soil in calcium as well as other elements.



SOIL TREATMENT IN FOUR COUNTIES

The scientific treatment of four types of soils demonstrates the value of supplying in proper amounts the four elements of plant food not always present in the soil in sufficient amounts—nitrogen, phosphorus, potassium, lime.

and K, for potassium (Lat. *kalium*). In various combinations, they are used on the markers in the numerous agricultural experiment fields of the state to indicate the method of soil treatment applied to the experimental plots. These four elements, constituting less than 4 per cent of the weight of the mature crop, are the factors of soil fertility that require the intelligent consideration of the farmer.

An inexhaustible supply of calcium is found in Illinois limestone, and it may be readily procured. Leguminous plants such as clover, sweet clover, alfalfa, cowpeas, and soy beans, on whose roots nitrogen-gathering bacteria thrive, may be grown in crop rotations and plowed under. A perpetual supply

The problem of a permanent and profitable agriculture on Illinois farms may be expressed in briefest form by the formula LNPK, in which L stands for limestone from which calcium is obtained; N, for nitrogen; P, for phosphorus;

These letters, singly and

in various combinations, are used on the markers in the numer-

ous agricultural experiment fields of the state to indicate the

method of soil treatment applied to the experimental plots.

These four elements, constituting less than 4 per cent of the

weight of the mature crop, are the factors of soil fertility that

require the intelligent consideration of the farmer.

of nitrogen is thus assured, if scientific methods of agriculture are adopted. Phosphorus is obtained from bone meal and rock phosphate. It must be purchased and applied to the land. The known phosphate supplies of the world are limited. The most important producing mines are in Tennessee, South Carolina, and Florida. The largest reserves yet discovered are in Idaho, Montana, and Utah. It is possible that the supply of rock phosphate may be the limiting factor in the development of a permanent and profitable agriculture throughout the nations of the world. Most Illinois soils are exceedingly rich in potassium and this element need not be given special attention in all parts of the state. In the peaty swamp lands, however, soil improvement is almost wholly dependent on the application of the potassium salts in a concentrated form. The largest potassium beds are found in Germany, and most of the world has been dependent upon these deposits for their potash supply. It is now known that our supply can be largely won from smelter fumes and the dust of cement plants.

Fertility in Illinois soils.—The upper $6\frac{2}{3}$ inches on an acre of fertile soil in good physical condition contains a total of not less than 8,000 pounds of nitrogen, 2,000 pounds of phosphorus, and 30,000 pounds of potassium. With these numbers in mind, the farmer can determine the elements in which his land is deficient if he has at hand the report of the Soil Survey giving total amounts of nitrogen, phosphorus, and potassium per acre in lands belonging to the same soil type as the farm under consideration. The table on page 156 from Bulletin No. 123 of the Agricultural Experiment Station gives the fertility in the various soil areas and soil types most widely represented in the state.

The first column of the table indicates the soil type by number. The figures representing hundreds correspond to the soil *areas* of the state as numbered on the soil map, and the name of the soil *area* is given in the second column. The two right-hand figures of the first column stand for a soil *type*, which is named in the third column. Thus 30 stands for "gray silt loam on tight clay," while 330 tells that this gray silt loam on tight clay is in the soil *area* indicated on the map by the number 3, the Lower Illinoian glaciation. The number 26

TABLE I
FERTILITY IN ILLINOIS SOILS
Average Pounds per Acre in Surface Soil (0-6½ inches)*

1	2	3	4	5	6	7
SOIL TYPE No.	SOIL AREA OR GLACIATION	SOIL TYPE	TOTAL NITRO-GEN	TOTAL PHOS-PHORUS	TOTAL POTAS-SIUM	LIME-STONE REQUIRED
Prairie Lands, Undulating						
330..	Lower Illinoisan	Gray silt loam on tight clay	2880	840	24940	2-5 tons
426..	Middle Illinoisan	Brown silt loam	4370	1170	32240	Rarely
526..	Upper Illinoisan	Brown silt loam	4840	1200	32940	Rarely
626..	Pre-Iowan	Brown silt loam	4290	1190	35340	½-1 ton
726..	Iowan	Brown silt loam	4910	1220	32960	½-1 ton
1126..	Early Wisconsin	Brown silt loam	5050	1190	36250	Rarely
1026..	Late Wisconsin	Brown silt loam	6750	1410	45020	Rarely
Prairie Lands, Flat						
420..	Middle Illinoisan	Black clay loam	5410	1430	31860	None
520..	Upper Illinoisan	Black clay loam	6760	1690	29670	None
1120..	Early Wisconsin	Black clay loam	7840	2030	35140	None
1220..	Late Wisconsin	Black clay loam	8900	1870	37370	None
Timber Uplands, Rolling or Hilly						
135..	Unglaciated	Yellow silt loam	1890	950	31450	2-5 tons
335..	Lower Illinoisan	Yellow silt loam	2150	950	31850	2-5 tons
435..	Middle Illinoisan	Yellow silt loam	1870	820	33470	1-2 tons
535..	Upper Illinoisan	Yellow silt loam	2010	840	34860	1-2 tons
635..	Pre-Iowan	Yellow silt loam	2390	850	37180	1-2 tons
735..	Iowan	Yellow silt loam	1910	910	35780	1-2 tons
1135..	Early Wisconsin	Yellow silt loam	1890	870	32720	1-2 tons
864..	Deep loess	Yellow fine sandy loam	2170	960	35640	1-2 tons
Timber Uplands, Undulating						
1034..	Late Wisconsin	Yellow-gray silt loam	2890	810	47600	(?)
760..	Iowan	Brown sandy loam	3070	850	26700	(?)
Sand, Swamp, and Bottom Lands						
1331..	Old bottom lands	Deep-gray silt loam	3620	1420	36360	1-4 tons
1451..	Late bottom lands	Brown loam	4720	1620	39970	Rarely
1481..	Sand plains and dunes	Sand soil	1440	820	30880	(?)
1401..	Late swamp	Deep peat	34880	1960	2930	Rarely

* The numbers given in this table represent the total amounts contained in two million pounds of the surface soil on the dry basis, with the exception of peaty swamp soil, for which the amounts in one million pounds are used, because the specific gravity of peaty soil is only one-half that of ordinary soil; for sand soil two and one-half million pounds are used, because it is about one-fourth heavier than ordinary soil.

stands for "brown silt loam"; but 426 tells that this brown silt loam is in the Middle Illinoisan glaciation; 526 locates it in Upper Illinoisan glaciation; and 1126 in the Early Wisconsin.

Columns 4, 5, and 6 show the total nitrogen, phosphorus, and potassium present in one acre of surface soil to a depth of $6\frac{2}{3}$ inches. By comparing these amounts with the minimum amounts given above for an acre of fertile soil, it is easy to see whether the soil type under consideration is deficient in one or more of these limited elements of plant food. Column 7 shows the amount of limestone required to correct the acidity of the soil.

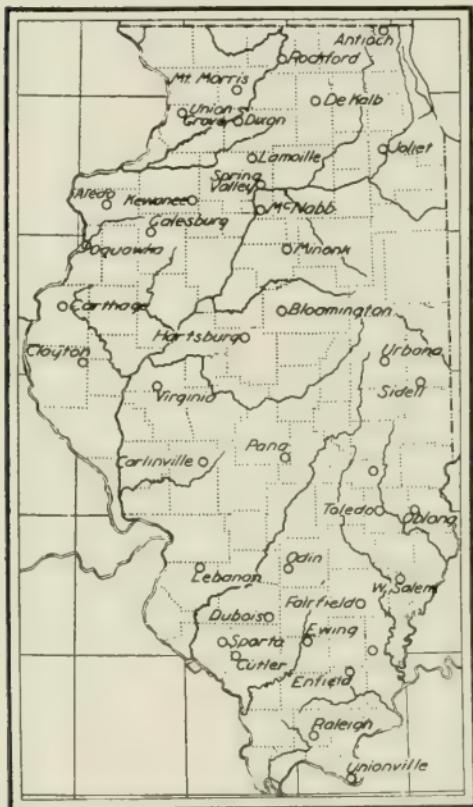
Thus by turning to the map we see that a farm in Sangamon County is in soil area No. 4, the Middle Illinoisan glaciation. By examining the table we learn that if this Sangamon County farm is made up of undulating prairie lands it belongs to soil type No. 426, "brown silt loam," and that the upper $6\frac{2}{3}$ inches of an acre of this soil contains 4,370 pounds of nitrogen, 1,170 pounds of phosphorus, and 32,240 pounds of potassium. By comparison with the requirements of a fertile soil we find that this land is deficient to the amount of 3,630 pounds of nitrogen and 830 pounds of phosphorus per acre, while there is an excess of potassium. If the farm lies in the flat prairie lands of Sangamon County, it belongs to soil type No. 420, "black clay loam," and the deficiencies for nitrogen and phosphorus are somewhat smaller than in the "brown silt loam." If the farm lies in the rolling or hilly timber uplands of Sangamon County, it belongs to soil type No. 435, "yellow silt loam." The deficiencies for nitrogen and phosphorus are very great, and a liberal application of ground limestone is required.

The county soil report for Sangamon County shows the soil types of our selected farm accurately mapped to ten-acre areas, and the report contains definite information as to the best methods of increasing the fertility in the various soil types.

The table shows that the nitrogen content of the surface soils per acre varies from 1,440 pounds in the sand soil to 34,880 pounds in deep peat; the phosphorus, from 810 pounds in yellow-gray silt loam to 2,030 pounds in black clay loam; potassium, from 2,930 pounds in deep peat to 47,600 pounds in yellow-gray silt loam. Only two of the soil types given in the

table have an excess of nitrogen over the minimum amount indicated for a fertile soil; only one has an excess of phosphorus; while all but two have an excess of potassium.

Agricultural experiment fields.—Agricultural experiments are of real worth only as valuable and practical results are made available to the farmers and used by them. Scientific soil treatment is brought directly to the farmers of Illinois in their home localities by means of agricultural experiment fields. These fields are established in all parts of the state on various kinds of soil typical of the regions in which the fields are located. The experiment fields are operated under the ordinary crop conditions of the locality, and the farmers may learn the effect of various methods of soil treatment by observing the field in their locality during the season and on special occasions when a representative of the Agricultural Experiment Station visits the field to discuss the results with



MAP OF ILLINOIS, SHOWING EXPERIMENT FIELDS

Experiment fields, located on the various kinds of soils, enable farmers to learn by direct observation the best treatment for their own farms and the probable results.

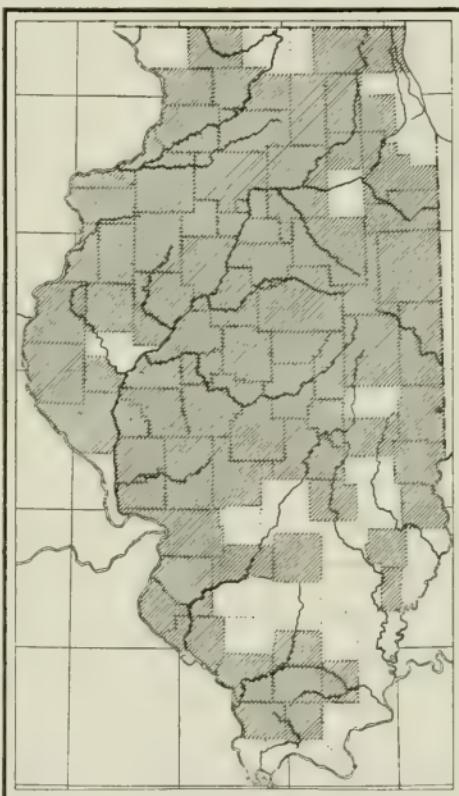
the farmers of the neighborhood. Information concerning these experiment fields has been obtained from various publications of the experiment stations.

The first experiment fields were established in 1901 on tracts of rented land. Since 1908 fields have been located only

on land donated by the community and deeded to the state. In 1916 there were 39 fields, 12 of which were rented and 27 owned by the state. The names and locations of the fields are shown on the accompanying map.

The diagram of the Urbana Experiment Field on page 160 represents a typical experiment field of 20 acres. The field is divided into 5 series corresponding to the different fields of a farm. Each series is divided into 10 plots so that ten methods of soil treatment may be tested on the plots of each series. Each plot covers exactly one-tenth of an acre. The results are then easily converted into acre units.

On this field two different systems of farming are practiced: a live-stock system and a grain system. In the live-stock system, the grains, hay, and forage are fed to live stock; the cornstalks and straw are used for bedding. The resulting manure is returned to the land and constitutes the important source of nitrogen and organic matter for soil improvement. In the grain system, the nitrogen and organic matter are maintained by plowing under all crop residues after the seed is removed (cornstalks, the straw from wheat, oats, soy beans, clover, and some cover crops). Under this system, the grain,



COUNTIES HAVING FARM ADVISERS, 1918

Through co-operation of county, state, and federal governments, trained farm advisers are aiding in the development of a better agriculture in Illinois.

the alfalfa, and the clover or other legume seeds are marketed. Alfalfa is regarded as a money crop, since sufficient residues are provided in the regular four-year rotation to supply the needs of the non-legumes for nitrogen.

In both systems of farming there are check plots which do not receive any treatment. The only benefits the soil receives

are those which are incidental to the rotation. Everything is removed from the land, and nothing returned; which means a gradual decrease in productive power and eventual land ruin. The purpose of these plots is to show by comparison the value of the treatment. The other plots receive definite treatments in such a way that the definite needs of the soil may be determined; whether it be manure or residues alone, or lime in addition, or lime and phosphorus in addition that must be applied in order to insure greater production. To two plots in the series potassium

501 O	502 R	503 M	504 R L	505 M L	506 R L P	507 M L P	508 R L P K	509 M L P K	510 Cv M's L P's
401 O	402 R	403 M	404 R L	405 M L	406 R L P	407 M L P	408 R L P K	409 M L P K	410 Cv M's L P's
301 O	302 R	303 M	304 R L	305 M L	306 R L P	307 M L P	308 R L P K	309 M L P K	310 Cv M's L P's
201 O	202 R	203 M	204 R L	205 M L	206 R L P	207 M L P	208 R L P K	209 M L P K	210 Cv M's L P's
101 O	102 R	103 M	104 R L	105 M L	106 R L P	107 M L P	108 R L P K	109 M L P K	110 Cv M's L P's

DIAGRAM OF URBANA EXPERIMENT FIELD

O = No treatment; M = Manure; L = Lime-stone; P = Phosphorus; R = Residues (cornstalks, straw of wheat and oats, and all legumes except seed); K = Potassium; Cv = Cover crop.¹

is added in order to obtain information in regard to the possible need for that element. In both systems of farming, provision is made for the maintenance and the increase of those elements of plant food and those physical conditions necessary for the best plant growth as indicated by the soil survey, the soil analysis, and other sources of knowledge.

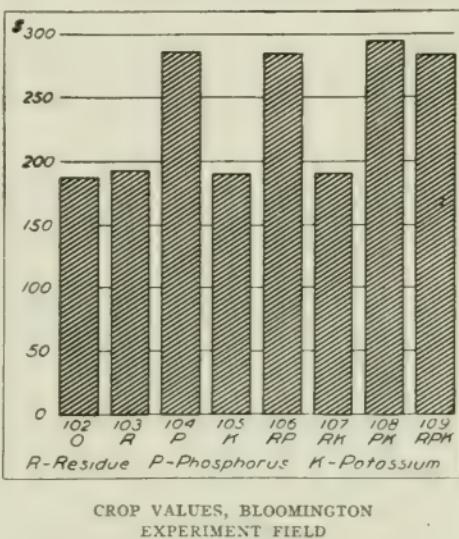
¹ *Summary of Illinois Soil Investigations*, Bulletin 193, Illinois Agricultural Experiment Station.

It will be noted in the diagram that those plots whose numbers end in 1 receive no treatment; those ending in 3, 5, 7, and 9 receive manure and therefore illustrate live-stock farming; those ending in 2, 4, 6, and 8 receive residues and thus illustrate grain farming; while 10 has residues in the form of cover crops and also manure, thus representing a combination of live-stock and grain farming. The actual yields of the experiment field, year after year, when studied in relation to soil treatment, reveals unmistakably the methods of scientific farming best adapted to the farms of the locality having the same soil type as the experiment field. Very few farms of Illinois are as far as 50 miles from one of the permanent experiment fields.

Some practical results.—The Bloomington Experiment Field is located about two miles northeast of Bloomington on the brown silt loam prairie soil of the Illinois corn belt.

It is typical of extensive areas of farm lands in central Illinois. The total crop values per acre during thirteen successive years, 1902 to 1914 inclusive, are shown in Table II, on page 162, and indicate clearly that soil improvement is not only possible, but extremely profitable, on the most fertile tracts of Illinois soils. The prices used in this table are much lower than the war-time prices of later years.

The plot which received no treatment yielded, in thirteen years, crops valued at \$266.90 per acre, or an average of \$20.53 per acre per year; while the plot treated with lime and



This graph indicates the total value per acre of thirteen crops, 1902-14, produced on plots with different treatment. Only when phosphorus is included in the treatment are the yields strikingly increased on the soil type represented by the Bloomington Experiment Field.

phosphorus yielded, during the same period, crops valued at \$409.45 per acre, or an average of \$31.50 per acre per year, a gain of \$10.97 per acre per year, at a cost of \$2.50 per acre per year, leaving a net gain of \$8.47 per acre per year with a much-improved and a much more valuable soil than now found on the

TABLE II

VALUE OF CROPS PER ACRE IN THIRTEEN YEARS, BLOOMINGTON FIELD
BROWN SILT LOAM PRAIRIE, EARLY WISCONSIN GLACIATION

PLOT	SOIL TREATMENT APPLIED	TOTAL VALUE OF THIRTEEN CROPS*	
		Lower Prices	Higher Prices
101.....	None	\$186.83	\$266.90
102.....	Lime	186.76	266.80
103.....	Lime, residues	193.83	276.90
104.....	Lime, phosphorus	286.61	409.45
105.....	Lime, potassium	190.53	272.19
106.....	Lime, residues, phosphorus	285.03	407.19
107.....	Lime, residues, potassium	191.10	273.00
108.....	Lime, phosphorus, potassium	294.91	421.31
109.....	Lime, residues, phosphorus potassium	284.47	406.39
110.....	Residues, phosphorus, potassium	259.10	370.15

TABLE III

VALUE OF INCREASE PER ACRE IN THIRTEEN YEARS

For residues.....	\$ 7.07	\$ 10.10
For phosphorus.....	99.85	142.65
For residues and phosphorus over phosphorus.....	-1.58	-2.26
For phosphorus and residues over residues.....	91.20	130.29
For postassium, residues, and phosphorus over residues and phosphorus.....	- .56	- .80

* Lower prices are based on 70 cents a bushel for wheat, 35 cents for corn, 28 cents for oats, \$7 a ton for hay; higher prices, \$1 a bushel for wheat, 50 cents for corn, 40 cents for oats, \$10 a ton for hay.

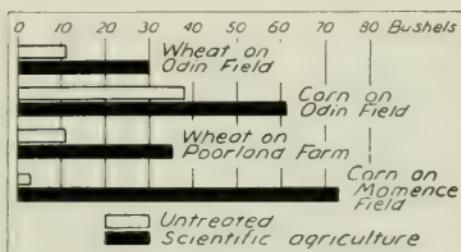
untreated plot. Since \$8.47 is 6 per cent of \$141, land receiving the scientific treatment may be capitalized at \$141 more per acre than the untreated land.

Thus, if a quarter-section of such land as the Bloomington Experiment Field has been farmed for thirteen years after the manner of the untreated plot, and is now valued at \$175

per acre, an adjoining quarter-section of the same type of soil given scientific treatment for the same period may be valued at \$316 per acre. In other words, the two 160-acre farms, having precisely the same value thirteen years ago, are now valued at \$28,000 and \$50,560 respectively, a difference of \$22,560, an amount sufficient to purchase 128 acres of the untreated farm at \$175 per acre. If invested in United States liberty bonds, at $4\frac{1}{4}$ per cent interest, this increased value would yield an annual income of \$1,062.

At the Odin Experiment Field in Marion County, on poor gray prairie land, scientific soil treatment changed the yield of wheat, in four years, from 11.6 bushels per acre to 29.5 bushels, an increase of 17.9 bushels per acre, or 154 per cent. Corn production was increased from 38.3 bushels to 61.3 bushels, or 60 per cent.

In the same county, in 1908, Dr. Cyril G. Hopkins purchased a tract of 300 acres known as Poorland Farm and began giving it scientific treatment. In 1913 he harvested 1,278 bushels of wheat from 36 acres of this land, a yield of $35\frac{1}{2}$ bushels per acre. An untreated strip of $1\frac{1}{2}$ acres in the same field yielded $11\frac{1}{2}$ bushels per acre. This is a gain of 24 bushels per acre, or 208 per cent. This particular field had been agriculturally abandoned for five years prior to Dr. Hopkins' purchase. As it was purchased for \$15 per acre, the single crop of 1913 had a value at least twice as great as the purchase price of the land. On the same farm the yield of wheat in 1917 was 7.7 bushels per acre on land which had been treated with manure alone, while the yield on land treated with manure, limestone, and raw rock phosphate was 44.1 bushels per acre. At the government price of \$2.20 per bushel for the 1917 wheat crop, this yield had a value of \$97 per acre.



CROP YIELDS ON ILLINOIS SOILS AS INFLUENCED BY SCIENTIFIC AGRICULTURE

The Illinois Agricultural Experiment Station, through scientific research, demonstrates how Illinois farms may be improved in fertility and increased in productiveness.

At the Momence Experiment Field in Kankakee County on peaty swamp soil, the corn crop of 1903 yielded 3.9 bushels of corn per acre on the untreated plot; while the adjoining plot, to which potassium had been added, produced 72.7 bushels per acre.

With such results as these, obtained under ordinary field conditions in many parts of the state, the era of scientific



WHEATFIELD ON POORLAND FARM, MARION COUNTY

Dr. Cyril G. Hopkins is here seen on May 26, 1917, in the wheatfield where his application of scientific agriculture to "poor land" since 1903 gave for the season of 1917 a yield of 44.1 bushels of wheat per acre, while an untreated area on the same farm yielded only 7.7 bushels per acre. (Copyright by Keystone View Company.)

farming in Illinois is fairly begun, and a system of permanent and profitable agriculture may be promptly developed on every farm of the state if all landowners and land operators apply the scientific knowledge placed at their disposal by the researches of those who have spent many years in the study of Illinois soils.

CHAPTER XI

AGRICULTURE

Farm products.—The variety of Illinois farm products is indicated by the following list of crops reported in the United States Census of 1910:

Cereals: corn, oats, wheat, emmer and spelt, barley, buckwheat, rye, kafir corn, and milo maize.

Other grains and seeds: beans, peas, peanuts, broom corn seed, flaxseed, sorghum cane seed, alfalfa seed, millet seed, other tame grass seeds, flower and garden seeds.

Hay and forage: timothy alone, clover alone, timothy and clover mixed, alfalfa, millet, other tame or cultivated grasses, wild, or prairie grasses, grains cut green, coarse forage, root forage.

Other crops: potatoes, sweet potatoes and yams, other vegetables, tobacco, broom corn, flowers and plants, nursery products.

Small fruits: strawberries, blackberries and dewberries, raspberries and loganberries, currants, gooseberries, cranberries.

Orchard fruits: apples, peaches and nectarines, pears, plums and prunes, cherries, apricots, quinces, mulberries.

Grapes.

Nuts: Persian or English walnuts, pecans, black walnuts, butternuts, chestnuts, hickory nuts.

Sub-tropical fruits: figs, Japanese persimmons.

Sugar crops: maple sugar, maple sirup, sugar beets, sorghum cane, sorghum sirup.

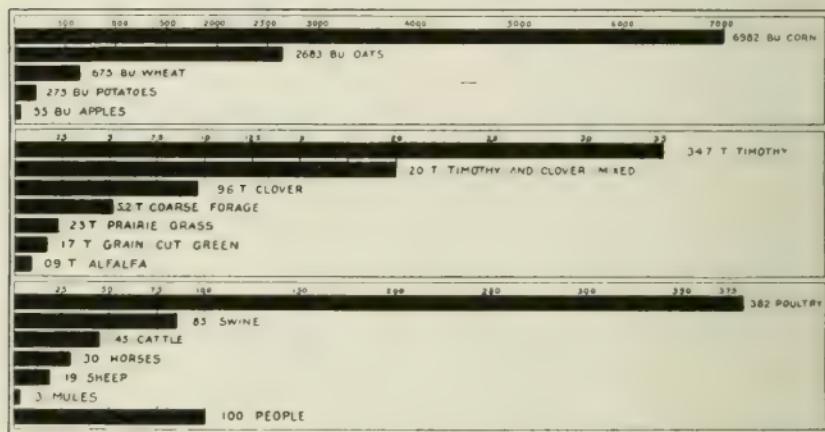
Forest products of farms: firewood, fencing material, logs, railroad ties, poles, standing timber sold.

Facts of agriculture.—The accompanying table gives significant figures with reference to Illinois as an agricultural state.

TABLE I
VALUES OF SELECTED CROPS, 1909, COMPARED WITH 1917

	1909	1917
Corn.....	\$198,000,000	\$459,000,000
Oats.....	60,000,000	158,000,000
Wheat.....	38,000,000	61,000,000
Hay and forage.....	41,000,000	68,000,000
Total, four leading crops.	\$337,000,000	\$746,000,000

While the corn crop of 1917 exceeded that of 1909 by only 28,000,000 bushels, or 7 per cent, its value exceeded that of 1909 by \$261,000,000, or 130 per cent. The yield of oats also exceeded the yield of 1909, but there was a decrease in the yield of wheat and hay and forage. Thus while the total acreage and total yield of crops for 1917 differed but little from those of 1909, these four crops alone had a value of \$374,000,000 greater than the value of all crops for 1909. Thus with but slightly increased yields the value of farm crops was more than doubled by war conditions.



AVERAGE PRODUCTION PER SQUARE MILE OF CEREALS, FORAGE, AND ANIMALS

The average density of population for Illinois in 1910 was 100 inhabitants per square mile. This graph therefore indicates the amount of agricultural products raised in the state for every 100 persons. The per capita production is found by moving the decimal point two places to the left.

Four leading crops.—Corn, oats, and wheat are the only cereals grown on a large scale in Illinois. These three cereal crops with hay and forage produce nine-tenths of the value of all crops in the state, and they occupy a still larger proportion of the area devoted to crops. The methods employed in raising and harvesting these staple crops make it possible for Illinois farmers to produce large values per man. All of these four crops are grown in every county of the state, but each crop has its areas of largest production determined by various factors among which are soil, climate, land relief, and markets.

Corn.—Corn thrives best in well-drained, deep, warm, black loam with an abundance of organic matter. The most favorable climatic conditions for corn are an average summer



FARMER'S WIFE PLOWING WITH A TRACTOR

Tractor cultivation is making rapid development on the level prairie lands of the Central States.

temperature (June, July, and August) of about 75° F. with warm nights as well as warm days, and an average rainfall during the same period of 8 inches or more, well distributed through the three months. Illinois with its average summer

temperature of 70° to 77° and its average summer rainfall of about 11 inches for all parts of the state thus provides the ideal climatic conditions for this crop. While corn is grown in every county of Illinois, it is raised most largely in the central and east-central parts of the state on the rich, black loams of the Wisconsin glaciation. The region of heavy corn production is almost coincident with the region of highest land values of

the state, \$125 or more per acre, according to the census of 1910.

Illinois summer temperatures are always favorable to growth of corn, while the amount and distribution of rainfall is not uniformly favorable.

There is sufficient rainfall almost every year to produce maximum crops. The difficulty is with its distribution. The injury resulting from the

CORN CROP OF THE UNITED STATES

AND OF ILLINOIS

On the United States map each dot represents 100,000 acres; on the Illinois map, 5,000 acres. More corn is produced in the corn belt of the Central States than in the rest of the world. Illinois and Iowa compete for first place among the states.

irregularity in the distribution of the rainfall to some extent by drainage, tillage, increasing and maintaining the organic matter of soils, and keeping the soils well supplied with plant food.

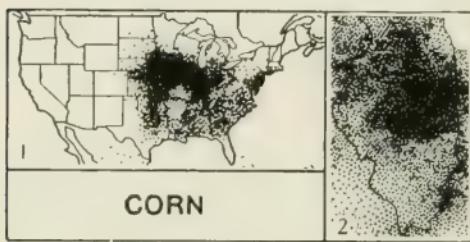
This uneven distribution of the rainfall is a sufficient incentive to cause the farmer to take every precaution for storing and holding the moisture in the soil before the crop is planted by preparing a deep, mellow seed bed, or for carrying off quickly excessive amounts of rain. Corn should receive an average of at least 2.5 inches of rainfall per month during the three months of its growth. The effects of rainfall during June, July, and August upon corn yields are shown by the records of the old continuous corn plot at the University. Corn has been grown on this plot since 1879, but there is no record of the yield previous to 1889.

Summer rainfall

Less than 7 inches	25.3 bu. per acre (8 yr. av.)
Between 7 and 10 inches	32.4 bu. per acre (9 yr. av.)
Over 10 inches	39.8 bu. per acre (11 yr. av.)

When the rainfall was less than two inches per month, the yield was reduced for a four-year average to 24.4 bushels per acre, and when the rainfall was over thirteen inches, the yield was 45.9 bushels per acre for a seven-year average. This is a difference of 21.5 bushels between yields produced with what might be called the maximum rainfall and those produced with the minimum at the University of Illinois. It is evident from this that a month during which there is less than two inches of rainfall may be regarded as a dry month.¹

¹J. G. Mosier, *Climate of Illinois*, Illinois Experiment Station.



CORN CROP OF THE UNITED STATES
AND OF ILLINOIS

Importance of corn.—Corn is by far the most important crop of the United States. The acreage and also the value of the corn crop are greater than that of wheat, oats, barley, rye, buckwheat, rice, fruits, and nuts combined. The geographic conditions which are essential to large yields of corn are found in only a few regions of the world, and most extensively in the United States.

Corn is pre-eminently the American crop, grown on three-fourths of all the farms of the United States, which produces nearly three-fourths of all the corn in the world. Within the United States three-fourths of all the corn produced is grown in the Mississippi Valley. There are two centers of heavy production—one in central Illinois and the other in the Missouri Basin of western Iowa and eastern Nebraska. The total corn acreage of Illinois in 1909 was 10,046,000, or 10 per cent of that for the country as a whole; Iowa had 9,229,000 acres in corn; Kansas, 8,109,000 acres; Nebraska, 7,226,000 acres; Missouri, 7,114,000 acres; and Indiana, 4,901,000 acres; these six states combined having 47 per cent of the corn acreage of the United States and 57 per cent of the production. In this region of concentrated production there has developed a system of live-stock farming adapted to the utilization of corn. Nearly half of the swine of the country are in these six states and one-third of the beef cattle.

The acreage devoted to corn constitutes over 75 per cent of the total acreage in crops in some of the mountainous counties of eastern Kentucky, where a moderately dense rural population derives its meager livelihood largely from the cultivation of small patches of corn, averaging from 10 to 15 acres per farm. The production of corn is small also in Florida and in the southern parts of Alabama and Mississippi, where most of the land is still in forests, yet corn constitutes in this region over 50 per cent of the total land in crops.

Corn is the principal source of food supply of the American people, but outside of the South very little of the corn is directly consumed by man. Most of the crop is fed to cattle and hogs, and consumed as beef, a pound of which represents 10 or 12 pounds of corn, or as pork, to produce a pound of which 5 or 6 pounds of corn are required. Much of the corn raised in central and northern Illinois, as well as a considerable portion of that grown in Iowa, is shipped to Chicago, where it is made into starch, glucose, and corn meal, or is exported, but outside a radius of about 200 miles from that city



TALL CORN AND SUNFLOWER,
RICHLAND COUNTY

When the lower leaves of the corn begin to change from green to brown, the corn is ready to cut and to be placed in shocks. This farmer has left an exceedingly tall stalk of corn uncut. (Copyright by Robert Ridgway.)

the corn is fed to cattle and hogs whose concentrated value can better bear the cost of transportation to market. The corn grown in the South is practically all consumed at home, being made into "hog, hominy, and hoe-cake," the staple food products of that region.¹

Leading corn states.—Illinois and Iowa are in a class by themselves as corn-producing states. They are rivals for first place, but they have no rival state for second place. A table at the close of this chapter shows, in round numbers, the acreage, production, and value of corn, oats, wheat, hay, and forage for Illinois, and for the United States for nine years, 1909 to 1917 inclusive. For these nine years the corn acreage of Illinois exceeded that of Iowa each year except 1917, and the production of Illinois exceeded that of Iowa in five years of the nine. These two states with a combined area of only 112,000 square miles produce more than one-fourth

of the corn crop of the United States and about one-fifth of the world's crop.

One-half of the land in Illinois devoted to crops is planted to corn, and the value of the corn is equal to that of all other crops of the state. Corn is raised in every county of Illinois, and on 90 per cent of all the farms of the state.

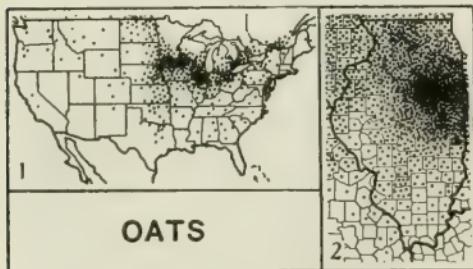
OAT CROP OF THE UNITED STATES AND OF ILLINOIS

On the United States map each dot represents 100,000 acres; on the Illinois map, 5,000 acres. Oats are grown more widely in the United States than any other crop except the potato. The oat crop stands next to corn in Illinois in acreage and value.

Corn production for the ten leading counties in 1909, with acreage and average yield per acre, is shown in the table at the close of this chapter. The average yield per acre for the state was 38.8 bushels.

Oats.—The oat crop occupies more than one-fifth of the total crop acreage of Illinois and is second in acreage and value. Oats are grown in every county of the state, but the heavy production is in the corn belt, where the crop is especially

¹ Finch and Baker, *Geography of the World's Agriculture*, U.S. Department of Agriculture.



important in crop rotation with corn. Oats are not limited in distribution so closely as corn by conditions of soil and climate. They grow well on a wide variety of soils, giving good yields on rather poor soils if there is abundant moisture. They thrive best in a cool, moist climate, but do well in warmer regions if the rainfall is abundant. In Illinois they are sown in the early spring before corn-planting time, and get a good start before the season is warm enough for the growth of corn. They are harvested in the summer after the corn has been laid by. They are commonly sown on land which was given to corn in the previous season. They are a good crop with which to sow clover or other grass seed in the spring. Thus oats fit into the crop rotation and the seasonal requirements of farm labor of the corn belt in a most satisfactory way. With the common practice of raising two crops of corn followed by oats, then by clover or other grasses, the acreage of the oat crop is about one-half that of corn.

Oats are more widely grown in the United States than any other crop except the potato. They are especially valuable as horse feed, and are used locally much more largely than for shipment. The oat crop of 1909 occupied one-fifth of the crop acreage and produced one-sixth of the total crop values of the state. The crop of 1917 exceeded that of 1909 by 15 per cent in acreage, 63 per cent in total yield, and 165 per cent in value.



SPRING PLOWING ON FARM, DUPAGE COUNTY

A single team of strong horses and the "walking plow" are still necessary on Illinois farms, especially in small fields.

The large yield of 1917 was due to favorable climatic conditions. The high valuation is due to the large yield and to the war demands of the world for food.

In oats as in corn, Illinois and Iowa are in a class by themselves. In the nine years 1909 to 1917 inclusive, Illinois produced more oats than Iowa in only one season, 1909. In



OATFIELD, SHOWING THE PRAIRIE

Illinois ranks first as an agricultural state because of its large proportion of level prairie lands with a deep, rich soil. (Copyright by Keystone View Company.)

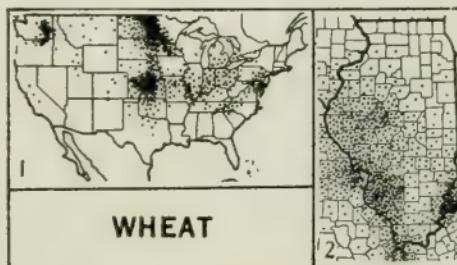
each year Iowa had a larger acreage than Illinois. In 1917, the banner season for both states, Illinois sowed to oats 4,700,000 acres and Iowa 5,200,000 acres. Illinois harvested 244,000,000 bushels and Iowa 246,000,000 bushels. The Illinois crop was valued at \$158,000,000 and the Iowa crop at \$155,000,000. These two states produce more than one-fourth of the total crop of oats of the United States.

The average production and average yield per acre for the ten leading counties in 1909 is found in the table at the close of this chapter. The average yield per acre for the state was 36 bushels.

Wheat.—Illinois does not rank so high in wheat production as in corn and oats, but wheat is raised in every county, and is an important crop in the western, southwestern, and southeastern parts of the state. The soils and climate of Illinois are well adapted to the production of large wheat crops, but larger profits are obtained from corn and oats. Illinois ranks seventh among the wheat-producing states, being exceeded in 1909 by North Dakota, Kansas, Minnesota, Nebraska, South Dakota, and Washington. In acreage of winter wheat, however, Illinois ranked third, Kansas and Nebraska leading.

Wheat is grown in the United States mostly on silt-loam and clay-loam soils and requires less humus than corn. Very little wheat is grown on sandy soils, since the yield is generally too small to be profitable. Soil has less influence than climate upon the quality and chemical composition of wheat, but appears to exert a powerful influence in determining permanency of production. The sections of the eastern United States where wheat has remained an important crop for 50 years—southeastern Pennsylvania, and Shenandoah Valley, western New York, western Ohio, and southwestern Illinois—are areas of silty soil, mostly derived from limestone. Upon such soils wheat probably will retain a place in the rotation permanently.¹

The wheat production of Illinois in 1909 was 37,000,000 bushels. This was $5\frac{1}{2}$ per cent of the total production of the United States. The per capita wheat production of Illinois was 6.7 bushels; that of the United States, 7.3 bushels. St. Clair was the leading county with 2,000,000 bushels.



WHEAT CROP OF THE UNITED STATES
AND OF ILLINOIS

On the United States map each dot represents 100,000 acres; on the Illinois map, 5,000 acres.

¹ Finch and Baker, *Geography of the World's Agriculture*.

The acreage, production, and average yield per acre for the ten leading counties of Illinois are shown in the table at the close of this chapter. The average yield per acre for the state was 17.3 bushels.



HARVEST SCENE ON ROCK RIVER, NEAR OREGON

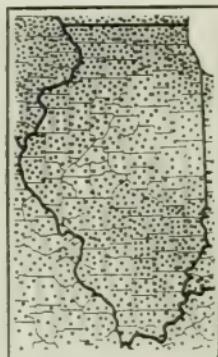
Cultivation of corn is completed about the time that wheat and oats are ready to be harvested, thus giving favorable conditions for farm labor.

The wheat crop of 1917 compared with that of 1909 shows a decrease in production of 19 per cent and an increase in value of 60 per cent.

Hay and forage.—Hay and forage rank third among the crops of Illinois in acreage and value. Hay and forage include those crops, other than grains, used for feed for animals. Timothy and clover are the principal hay crops of Illinois.

Corn, oats, wheat, rye, and barley, raised for grain, are *cereal* crops; cut green and used for ensilage or for hay they become *forage* crops. Since hay and forage are made up of many kinds of plants which thrive under a great variety of soil and climatic conditions, this crop is very widely distributed. Its large bulk per value makes transportation difficult and expensive. It is therefore used locally in a very large measure.

The map showing acreage for hay and forage indicates a more even distribution than for any other crop in Illinois. The region of greatest corn and oats acreage shows the smallest hay and forage acreage in the state. North and west of the heaviest corn acreage the increased hay and forage areas correspond to the largest production of cattle for dairy and feeding purposes. South of the corn belt the increased hay acreage is found on soils better suited to hay than to cereals, and here large quantities of timothy and other grasses are raised for shipment.



HAY AND FORAGE OF
ILLINOIS

Each dot represents
5,000 acres.

TABLE II
HAY AND FORAGE OF ILLINOIS, CENSUS 1910

Crops	Farms Reporting	Acres	Tons	Value
Timothy alone.....	109,050	1,587,219	1,947,572	\$20,028,486
Timothy and clover mixed	46,913	827,625	1,123,254	11,177,121
Clover alone.....	34,037	427,957	539,790	4,660,696
Alfalfa.....	3,116	18,344	52,284	583,476
Millet or Hungarian Grass	6,852	33,968	46,918	346,109
Other tame or cultivated grasses.....	6,631	128,258	122,888	742,637
Wild, salt, or prairie grasses	6,415	112,978	128,531	891,138
Grains cut green.....	10,426	80,226	99,828	832,987
Coarse forage.....	12,230	132,827	293,108	1,295,227
Root forage.....	34	33	293	2,183
Total for the state...	176,355	3,349,435	4,354,466	\$40,560,220

In the northern section of Illinois, the dairy district of the state, the leading hay crop is timothy and clover mixed. Throughout the rest of the state timothy is the chief hay crop. In 1909 timothy constituted one-half and timothy and clover mixed one-fourth of the hay and forage crop.

The relative importance of the various kinds of hay and forage plants in Illinois is well shown in Table II.

The hay and forage crop of 1917 compared with that of 1909 shows a decrease in acreage of 15 per cent, a decrease in production of 21 per cent, and an increase in value of 41 per cent.

5



A PRIMITIVE MOLASSES FACTORY, RICHLAND COUNTY

The sorghum juice is placed in large kettles over a hot wood fire. Impurities are skimmed off as the juice boils. Sorghum molasses is the result. (Copyright by Robert Ridgway.)

Among the four leading crops of Illinois there were substantial increases in acreage of corn and oats and important decreases in acreage in wheat and hay and forage in 1917 as compared with 1909. The farm lands of Illinois are so fully occupied that the total acreage of crops can be changed but slightly, but changes in acreage in various crops may be important during a series of years, depending in part on crop yields, crop prices, or special demands such as are created by war conditions.

Sugar crops.—In the early days a large part of the sugar used on the farm was produced in the form of molasses made

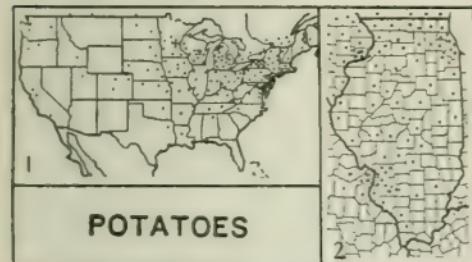
from the sorghum plant. The conditions of soil and climate required for sorghum production are identical with those of corn, and sorghum is still produced to some extent all over the state. A small amount of sugar is produced from the sugar maple in the wooded parts of the state.

Potatoes and other vegetables.—Potatoes rank next to wheat in acreage, production, and value. The crop of 1909 occupied 6 per cent as much land, produced 32 per cent as many bushels, and had 17 per cent of the value of the wheat crop of the same year. The potato crop of 1917 occupied 150,000

Sorghum cane is passed between rollers and the sweet juice thus pressed out is boiled down into molasses. (Copyright by Robert Ridgway.)

acres, yielded 13,000,000 bushels, and had a value of \$20,000,000. This exceeded the crop of 1909 by 9 per cent in acreage, 11 per cent in yield, and 220 per cent in value.

The chief potato regions of the United States are in Maine, New York, Michigan, and Wisconsin, on sandier soils and in a cooler climate than in Illinois. The Illinois



POTATO CROP OF THE UNITED STATES
AND OF ILLINOIS

On the United States map each dot represents 25,000 acres; on the Illinois map, 2,000 acres. Potatoes are more widely grown in the United States than any other crop. Illinois potatoes are grown mainly for local consumption, with the largest production near Chicago and St. Louis.

product is grown almost wholly for local use. The areas of largest acreage lie near Chicago and St. Louis. The bulky nature of potatoes per unit of value, the difficulty in handling

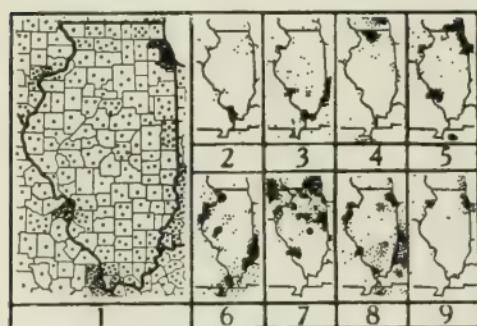


PRIMITIVE CANE-GRINDING MILL FOR MAKING SORGHUM MOLASSES, RICHLAND COUNTY

them for shipment, and their universal use as food necessitate as wide production as possible. Potatoes are more widely grown than any other crop in the United States. The census returns show that potatoes were reported from every county east of the Mississippi River except one at the southern extremity of Florida. West of the Mississippi they were reported from all counties except two in Colorado, where the altitude is too great for profitable agriculture of any kind, and several counties in the semiarid section of Texas.

Illinois, with 6 per cent of the population of the United States, produces but 3 per cent of the potato crop. Chicago

and other cities are readily supplied from the commercial potato regions of Michigan and Wisconsin. Since Illinois soils and climate are better adapted to other crops, the potato is not likely to become of great commercial importance. Potatoes were grown on 190,000 farms in Illinois. Corn is the only crop reported from a larger number of farms.



MAP SHOWING VARIETIES OF VEGETABLES

1. Acreage for all vegetables; each dot represents 500 acres.
- 2-9. Acreage for selected vegetables; each dot represents 50 acres.
2. Asparagus;
3. Muskmelons;
4. Green peas;
5. Cabbage;
6. Sweet corn;
7. Watermelons;
8. Tomatoes;
9. Onions.¹

Sweet potatoes and yams were grown on 20,000 farms mostly in the southern counties. The crop amounted to 1,000,000 bushels with a value of \$500,000.

Vegetables other than potatoes, sweet potatoes, and yams play an important part in the food production of Illinois, but each kind is not reported separately. This group of food plants includes lettuce, radishes, onions, tomatoes, sweet corn, asparagus, rhubarb, and numerous other plants common in the gardens and on the truck farms of Illinois. The wide distribu-

¹ All maps in this volume showing distribution of products by dots are from Finch and Baker's *Geography of the World's Agriculture*, United States Department of Agriculture.

tion of vegetable gardens in the state is shown by the fact that 120,000 acres of these gardens were found on 186,000 farms, and that 33,000 additional farms reported small vegetable gardens without estimating acreage or value. The product of 120,000 acres was valued at \$9,400,000, or about \$80 per acre. About 30 per cent of this acreage belonged to 2,227 farms, each of which produced vegetables valued at \$500 or more. The average acreage of vegetables on these farms was 16.5. These farms included the market gardens and truck farms which are carefully cultivated for profit. Their yield averaged about \$90 per acre.

Broom corn.—In marked contrast to potatoes and other vegetables, the production of broom corn is very strongly localized in Illinois. It is reported in the census returns from 70 counties, but 7 counties, lying in the south-central part of the state, produce 93 per cent of the crop. These counties in order of production are: Coles, Cumberland, Shelby, Moultrie, Douglas, Jasper, and Piatt. Illinois produced one-fourth of the broom corn of the United States. Oklahoma raised twice as much as Illinois, and Kansas about half as much. Coles County alone produced 42 per cent of the broom corn of Illinois and 10 per cent of that of the United States.

Fruit-growing.—Apples are the most important of the orchard fruits. Apples are grown in all of the 102 counties of the state, but the southern part of the state is of more importance than the northern in apple production. Apple-growing has increased in recent years because of the discovery of means of controlling insects and fungous diseases which formerly caused great losses.



A SOUTHERN ILLINOIS RHUBARB FIELD,
MASSAC COUNTY

Fresh fruits and vegetables gathered in southern Illinois on one day may be marketed in Chicago on the following day. (Copyright by Keystone View Company.)



MARKET GARDENS, COOK COUNTY

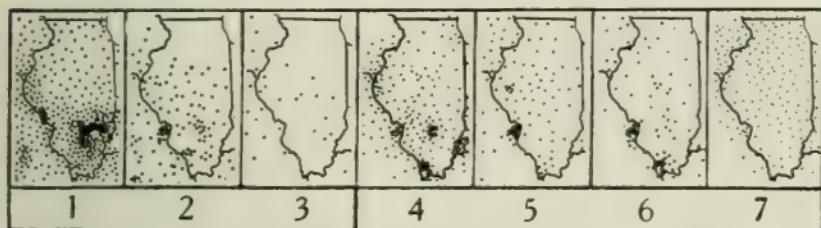
Market gardening requires intensive cultivation of the soil, and is best developed on small farms. Cook County, in which market gardening is largely developed, has more farms than any other county in Illinois. The number in 1920 was 5,305. McLean County stood next with 4,309 farms. (Photograph by W. D. Jones.)



GATHERING KIEFER PEARS, OLNEY, RICHLAND COUNTY

(Copyright by Robert Ridgway)

The trees planted in southern Illinois consist mainly of summer and early varieties for the more northern markets,



MAP SHOWING PRINCIPAL FRUIT CROPS

1-3. Each dot represents 500 acres. 1. Apples; 2. Peaches; 3. Plums.
4-7. Each dot represents 100 acres. 4. Pears; 5. Blackberries and Raspberries; 6. Strawberries; 7. Cherries.

while farther north fall and winter apples are grown. The largest commercial yield of apples in Illinois was that of 1915, amounting to 14,000,000 bushels. Only four states surpassed Illinois in apple production in that year. The crop of 1917 was about 40 per cent of a maximum crop with prices the best known for years. A three-acre orchard of summer varieties yielded apples valued at \$3,000, or \$1,000 per acre.

Other orchard fruits raised in Illinois in sufficient quantities to be given in the United States Census are peaches and nectarines, pears, plums and prunes, cherries, quinces, apricots, and mulberries.

Strawberries are the most important crop among the small fruits of Illinois. They are found in every county of the state, but they are grown for market more extensively in the southern



STRAWBERRY FIELD IN SOUTHERN ILLINOIS,
SHOWING PICKERS AT WORK, MASSAC COUNTY

The longer growing season of southern Illinois makes possible the production of small fruits and vegetables for an early market.
(Copyright by Keystone View Company.)

than in the northern part of the state. Pulaski, Union, and Massac counties produce more than one-third of the commercial crop of the state.

Other small fruits of Illinois listed in the United States Census are blackberries and dewberries, raspberries and loganberries, currants, and cranberries.

Summary.—Illinois lies in the center of the largest single area of fertile farm lands anywhere in the world. A productive soil, a favorable climate, and an industrious population have made Illinois the foremost agricultural state of the nation. The products of Illinois farms contribute largely to the raw materials of manufacture. The progressiveness of the farmers of Illinois and adjoining regions has made Illinois the world's most important region for the manufacture of agricultural implements by creating a strong and constant local demand for the latest and most improved farm machinery. Factories supplying the local needs have naturally extended their markets throughout the nation and the world.

The large production of farm crops and live stock in Illinois agriculture has stimulated transportation and trade in every part of the state so that all regions are within easy access of railroad facilities.

The agricultural practice of Illinois is influenced in an important way by the location and development of cities within or near the state. The Illinois corn belt is so near the Chicago grain market that a larger proportion of Illinois corn is sold as grain than in regions more distant from market. This practice requires care in maintaining the fertility of the land. Small farms, intensively cultivated, with consequent large yield per acre have been developed near the larger cities, especially Chicago and St. Louis. Dairy farming has developed most within easy shipping distance of Chicago.

Illinois may maintain its leadership in agricultural resources by applying on all farms of the state the principles of scientific agriculture which have been fully demonstrated by the Agricultural Experiment Station for every type of soil within the state. President Draper's words should be appreciated and heeded: "The wealth of Illinois is in her soil, and her strength lies in its intelligent development."

FACTS OF ILLINOIS AGRICULTURE, CENSUS 1910

Land area of Illinois.....	56,043 square miles
Land area of Illinois.....	35,867,520 acres
Land area in farms.....	32,522,937 acres
Land area not in farms.....	3,344,583 acres
Percentage of land area in farms.....	90.7 per cent
Improved land area in farms.....	28,048,323 acres
Woodland and other unimproved lands in farms.....	4,474,614 acres 86.2 per cent
Percentage of farm lands improved.....	78.2 per cent
Percentage of total land area in improved farm lands.....	251,872
Number of farms.....	129.1 acres
Average size of farms.....	20,294
Number of farms under 20 acres.....	210,093
Number of farms 20 to 260 acres.....	21,485
Number of farms over 260 acres.....	5,638,591
Population of Illinois.....	100
Population of state per square mile.....	22
Population of state per farm.....	6.3 acres
Land area of state per person.....	5 acres
Improved farm land per person.....	25 acres
Improved farm lands per family of 5.....	\$3,900,000,000
Total value of all farm property.....	\$15,500
Average value per farm.....	90.2 per cent
Percentage of value in land and buildings.....	1.9 per cent
Percentage in implements and machinery.....	7.9 per cent
Percentage in live stock.....	\$95
Average value of farm land per acre.....	\$108
Average value of the land and buildings per acre.....	\$372,000,000
Total value of crops, 1909.....	\$308,000,000
Total value of live stock on farms, 1910.....	16,536,457 acres
Area of cereals.....	3,349,435 acres
Area of hay and forage.....	\$298,000,000
Value of cereals.....	\$41,000,000
Value of hay and forage.....	\$33,000,000
Value of all other crops.....	\$1,400,000
Broom corn.....	\$500,000
Sugar crops.....	\$6,400,000
Potatoes.....	\$ 500,000
Sweet potatoes and yams.....	\$9,400,000
Other vegetables.....	\$3,700,000
Flowers and plants.....	\$ 800,000
Nursery products.....	\$3,800,000
Orchard fruits.....	\$1,100,000
Small fruits.....	\$3,300,000
Forest products of farms.....	\$1,900,000
Seeds.....	\$200,000
Minor crops.....	80 per cent
Percentage of cereals in value.....	11 per cent
Percentage of hay and forage.....	9 per cent
Percentage of all other crops.....	

TABLE III

SELECTED CROPS OF ILLINOIS AND UNITED STATES, 1909-17
(In millions of bushels, tons, acres, and dollars)

YEAR	ILLINOIS			UNITED STATES		
	Acres	Bushels	Farm Values	Acres	Bushels	Farm Values
Corn						
1909.....	10	390	\$198	98	2,500	\$1,400
1910.....	10.6	414	157	114	3,100	1,500
1911.....	10.1	335	181	105	2,500	1,500
1912.....	10.6	426	174	107	2,100	1,500
1913.....	10.4	282	177	105	2,400	1,600
1914.....	10.3	300	183	103	2,600	1,700
1915.....	10.4	376	203	108	3,000	1,700
1916.....	10.4	306	257	105	2,500	2,300
1917.....	11	418	459	119	3,100	4,000
Oats						
1909.....	4.1	150	\$ 59	35.1	1,000	\$ 414
1910.....	4.5	171	51	35.2	1,100	384
1911.....	4.2	121	51	37.7	920	414
1912.....	4.2	182	54	37.9	1,400	452
1913.....	4.3	104	39	38.3	1,100	439
1914.....	4.3	126	55	38.4	1,100	499
1915.....	4.8	195	68	40.7	1,500	555
1916.....	4.4	172	87	41.5	1,200	656
1917.....	4.7	244	158	43.5	1,500	4,000
Wheat						
1909.....	2.1	37	\$ 38	44	683	\$ 657
1910.....	2.1	31	27	49	695	621
1911.....	2.6	42	37	49	621	543
1912.....	1.1	9.8	8.6	45	730	555
1913.....	2.2	41	36	50	763	610
1914.....	2.5	46	46	53	891	878
1915.....	2.8	53	53	59	1,000	930
1916.....	1.4	16	26	52	639	1,000
1917.....	1.6	30	61	45	650	1,300
Hay and Forage						
1909.....	3.3	4.3	\$ 40	72	97	\$ 824
1910.....	2.8	3.7	44	45	60	747
1911.....	2.3	1.9	33	43	47	694
1912.....	2.5	3.2	41	49	72	856
1913.....	2.5	2.4	34	48	64	797
1914.....	2.2	1.9	27	49	70	779
1915.....	2.4	3.7	40	50	85	912
1916.....	3.1	4.5	50	54	89	1,000
1917.....	2.7	3.4	68	53	79	1,359

TABLE IV
TEN LEADING COUNTIES IN CORN PRODUCTION, CENSUS 1910

Rank	County	Acres in Corn	Percentage of Total Area	Total Bushels	Bushels per Acre
1.....	McLean	330,554	44.4	16,001,358	48.4
2.....	Livingston	291,296	33.3	13,452,315	46.2
3.....	La Salle	270,325	36.6	13,439,327	49.7
4.....	Champaign	291,207	44.0	12,914,426	44.3
5.....	Iroquois	283,806	40.3	12,679,838	44.6
6.....	Vermilion	218,010	38.6	9,171,678	42.0
7.....	Sangamon	215,664	39.9	9,155,739	42.4
8.....	Bureau	187,086	34.5	8,575,697	45.8
9.....	Logan	172,659	44.6	7,836,703	45.3
10.....	Macon	167,957	45.2	7,651,541	45.5

TABLE V
TEN LEADING COUNTIES IN OATS PRODUCTION, CENSUS 1910

Rank	County	Acres in Oats	Percentage of Total Area	Total Bushels	Bushels per Acre
1.....	Livingston	216,635	32.1	9,205,001	42.5
2.....	Iroquois	210,688	29.9	7,839,046	37.2
3.....	McLean	176,769	23.8	7,363,942	41.6
4.....	La Salle	155,064	21.0	6,879,858	44.4
5.....	Champaign	158,571	24.6	5,885,152	37.1
6.....	Will	133,065	24.5	5,121,244	38.5
7.....	Vermilion	120,913	21.4	4,405,782	38.1
8.....	Bureau	97,970	18.1	3,969,757	40.5
9.....	Ford	91,220	24.6	3,836,545	42.1
10.....	Kankakee	98,762	22.7	3,710,003	37.6

TABLE VI
TEN LEADING COUNTIES IN WHEAT PRODUCTION, CENSUS 1910

Rank	County	Acres in Wheat	Percentage of Total Area	Total Bushels	Bushels per Acre
1.....	St. Clair	114,907	26.4	2,021,081	18.4
2.....	Madison	106,658	22.5	1,911,497	17.9
3.....	Washington	89,493	25.1	1,181,765	13.2
4.....	Monroe	71,790	29.5	1,136,207	15.0
5.....	Pike	63,859	13.2	1,112,347	17.4
6.....	Clinton	65,852	21.1	1,109,405	16.9
7.....	Macoupin	63,688	11.1	1,097,472	17.2
8.....	Fulton	53,082	9.6	1,061,610	20.0
9.....	Sangamon	47,441	8.5	984,456	20.8
10.....	Christian	46,002	10.2	931,938	20.3

CHAPTER XII

ANIMAL INDUSTRIES

Illinois animals.—The farmers of Illinois are interested in the raising of animals as definitely as in the raising of crops. The animal industries are a part of the agricultural operations of the state. The large crop production per man of Illinois farms is possible only because of the large amount of animal power used per farm. A very large proportion of the crops of the state is used as feed for the work animals and the food-producing animals, thus leading to the consumption of crops on the farms where they are grown. The farmer thus markets much of his farm produce in the form of animals or animal products.

The following facts of 1910 are significant of the importance of the animal industries of the state: value of all crops raised, \$372,000,000; value of all domestic animals, \$331,000,000; number of horses, 1,600,000; value of horses, \$192,000,000; average value of horses, \$113; number of mules, 158,000; value of mules, \$19,000,000; average value of mules, \$123; number of asses and burros, 3,200; number of cattle, 2,500,000; value of cattle, \$76,000,000; average value of cattle, \$30; number of hogs, 4,700,000; value of hogs, \$37,000,000; average value of hogs, \$7.80; number of sheep, 1,000,000; value of sheep, \$5,000,000; average value of sheep, \$5; number of goats, 14,335; area of Illinois, 56,000 square miles; domestic animals per square mile, horses 30, mules 3, cattle 45, hogs 85, sheep 19; domestic animals per family of five persons, horses 1.5, cattle 2, hogs 4, sheep 1; number of dairy cows, included above, 1,000,000; amount of milk reported, 320,000,000 gallons; value of milk sold, \$18,000,000; butter made on farms, 46,000,000 pounds; value of butter made on farms, \$10,000,000; number of poultry, 32,000,000; value of poultry \$15,000,000; eggs produced, 100,000,000 dozens; number of eggs per person, 212; value of eggs, \$18,000,000; number of colonies of bees, 155,000; production of honey, 1,428,000 pounds; value of honey, \$196,000.

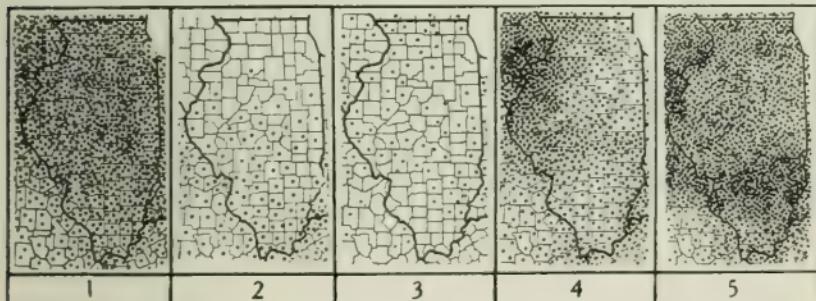
The following comparison of values for the United States from the census of 1910 and from the government estimate for 1917 shows the trend of crop values. The differences, it must be remembered, are not due to greatly increased production but to the influence of war-time prices.

TABLE I

United States	1910	1917
Value of crops.....	\$5,487,000,000	\$13,610,000,000
Value of animals and animal products	3,071,000,000	5,833,000,000
Total value of all farm products	\$8,558,000,000	\$19,443,000,000

These figures show that the value of crops of 1917 exceeded the value of crops as reported in the census of 1910 by 148 per cent; the value of animals and animal products had increased 90 per cent; and the total value of all farm products 127 per cent.

Horses and mules.—The 1,600,000 horses of Illinois are distributed throughout the state with an evenness not approached



DISTRIBUTION MAP OF PRINCIPAL ANIMALS IN ILLINOIS

Each dot represents: 1. Horses, 2,000; 2. Mules, 1,000; 3. Sheep, 10,000; 4. Swine, 5,000; 5. Poultry, 20,000.

by any other farm product, plant or animal. The slight decrease in the number of horses in the southern part of the state as shown on the map is accounted for by the number of mules found there. This even distribution of the number of

horses and mules over the entire state is due to the fact that good farm land is found in every county, and that the general farming operations require about the same number of draft animals per unit of area, even though there be important differences in the character of the soil, the value of the land, and the kind of crops cultivated. The cities and villages contained 234,000 horses, or 13 per cent of the total number.



ANIMAL-HUSBANDRY CLASS JUDGING PERCHERON HORSES, UNIVERSITY OF ILLINOIS

Students in animal husbandry learn the qualities of various breeds of animals by scoring animals selected from the fine stock on the University farm. (Copyright by Keystone View Company.)

The principal breeds of draft horses in Illinois are the Percheron, Clydesdale, Shire, and Belgian.

Since mules are adapted to a warmer climate than horses, they are found chiefly in the southern part of the state. Their sureness of foot and their ability to thrive on coarser feed than horses make them especially valuable for farm work among the Ozark Hills. The average value of mules is higher than that

of horses. In recent years mules are being used more widely than formerly.

The wide distribution and great usefulness of horses and mules in the United States are indicated by the census returns of 1910, in which horses were reported from every county in the country, and only twenty-three counties reported no mules. The ratio of mules to horses in Illinois is that of 1 to 10; the ratio for the United States is about 1 to 5.



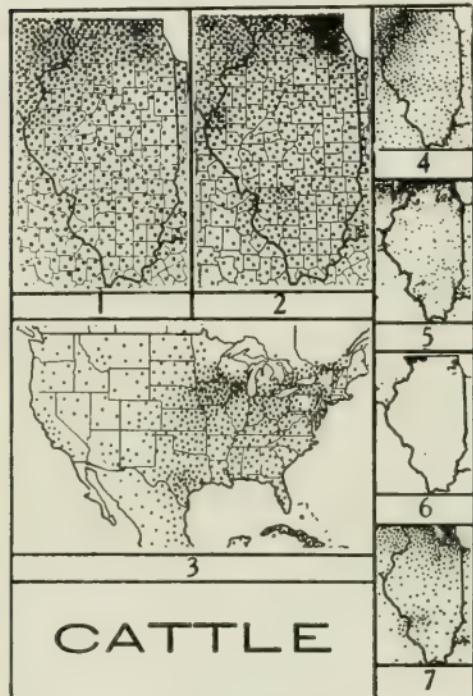
PLOWING WITH PERCHERON HORSES, NORMAL UNIVERSITY FARM, M'LEAN COUNTY

Modern machinery and strong horses enable one man to do much more farm work than in pioneer days. (Copyright by Keystone View Company.)

There are 15 acres of improved land per horse or mule in Illinois and one horse or mule for every three people. For the United States the ratio is about 20 acres of improved land per horse or mule and one horse or mule to every four people. A larger proportion of horses is required in the corn belt than elsewhere because of the frequent cultivation required for corn.

Cattle.—The number of cattle in Illinois in 1910 exceeded the number of horses and mules by 36 per cent, while the value of all cattle was but 36 per cent of the value of horses and mules. The distribution of cattle, as clearly shown on the map, is not so even as that of horses. The dairy interests of the

extreme northern counties and the cattle feeding carried on in some of the western counties lead to a density of distribution along the northern and northwestern borders of the state which extends beyond Illinois into the great cattle districts of Wisconsin and Iowa. This area of larger cattle interests in Illinois lies, for the most part, north of a line drawn from Chicago to Keokuk, Iowa. South of this line the cattle are distributed with an evenness similar to that of horses for the entire state. Here cattle raising is not a specialty but it is important in the general farming practice of the state.



MAP SHOWING DISTRIBUTION OF CATTLE IN
ILLINOIS AND IN THE UNITED STATES

Each dot represents: 1. All cattle, 5,000;
2. Dairy cows, 2,000; 3. All cattle in United
States, 100,000; 4. Steers and bulls, 2,000;
5. Creameries, one creamery; 6. Cheese factories,
one cheese factory; 7. Dairy products, \$100,000.

The region of heaviest corn production in Illinois does not have large numbers of cattle, while the state of Iowa, with about the same production of corn as Illinois, has 83 per cent more cattle than Illinois. The Illinois corn belt is so near to Chicago, the chief market for this grain, that a very large proportion of the Illinois crop is sold as grain. The farmers of western Illinois and of Iowa find it more profitable to feed their

corn and market the live stock on which the transportation charges are not so high per unit of value. Pasture land in western Illinois and in Iowa is more extensive than in the chief corn-belt region of east-central Illinois. This is due partly to the topography and partly to the requirements of the animal industries.

The city of Chicago contains two-fifths of the population of the state. Its need for a large supply of fresh milk is met by the great development of the dairy industry in northeastern Illinois and southeastern Wisconsin. This region has the heaviest distribution of dairy cattle to be found anywhere in the United States. Not only does this dairy region supply Chicago and other cities with fresh milk, but butter and cheese and condensed milk are also produced.

The principal breeds of dairy cattle in Illinois are the Holstein, Jersey, Guernsey, and Ayrshire.

The production of beef cattle depends on a supply of pasture, hay, and grain rather than on nearness to market. Beef cattle in Illinois are of most importance in the western part of the state and along the southern edge of the corn belt where the distance to the Chicago markets for fresh milk and for grain is sufficiently great to induce the farmer to market his corn in the form of beef, butter, and cheese rather than as grain or fresh milk.

The chief breeds of beef cattle in Illinois are the Shorthorn, Hereford, and Angus.



DAIRY CATTLE, HOGS, AND DAIRY BARN OF
ILLINOIS STATE NORMAL UNIVERSITY FARM,
M'LEAN COUNTY

This 90-acre farm, equipped with modern buildings, and stocked with Holstein cattle, Duroc-Jersey hogs, and poultry, furnishes superior farm conditions for observation and study by the students of agriculture. (Copyright by Keystone View Company.)

Hogs.—The distribution of hogs in Illinois is very similar to the distribution of beef cattle. The largest number of hogs are found along the western part of the state and along the southern edge of the corn belt.



JERSEY COW AND CALF NEAR ALFA, HENRY COUNTY

The Holstein, Jersey, Guernsey, and Ayrshire are the principal breeds of dairy cattle in Illinois.

about 5 cents per bushel higher than in Iowa and northern Missouri.

The principal breeds of hogs in Illinois are the Duroc-Jersey, Poland China, Chester White, Berkshire, Hampshire, Yorkshire, and Tamworth.

Sheep.—Illinois raises 15 per cent of the corn of the United States; 8 per cent of the hogs; 7 per cent of the horses; 4 per cent of the cattle; but only 2 per cent of the sheep. The 1,000,000 sheep of the state are not strongly localized. Sheep are reported from every county. Only one county reported fewer than 1,000, and four reported more than 30,000 each.

The largest number of hogs are found along the western part of the state and along the southern edge of the corn belt. As in the case of beef cattle this region of denser distribution extends across into the corn-belt districts of Iowa and northern Missouri. Iowa has 60 per cent more hogs than Illinois. The farm price of corn in Illinois averages



HEREFORD CALVES, DEPARTMENT OF ANIMAL HUSBANDRY, UNIVERSITY OF ILLINOIS

Shorthorn, Hereford, and Angus are the chief breeds of beef cattle in Illinois. The Hereford fattens readily and is suited for the less favorable conditions on the ranges. The white face is characteristic of this breed. (Copyright by Keystone View Company.)

Among the leading ten sheep-producing states of the United States, only three, Ohio, Michigan, and Missouri, lie east of the one-hundredth meridian. The ability of the sheep to thrive in rough regions with scant pasturage has carried the sheep-raising industry to the arid lands of the West, with Montana and Wyoming each raising 10 per cent of the total. Millions of sheep cross Illinois each year on the journey to the Chicago market. Feeding and shearing sheds are maintained at various railroad stations outside of Chicago where as many as 2,000 sheep are sheared in a single day by power-driven shears. The wool for manufacture and the sheep for mutton are then marketed separately.

The principal breeds of sheep in Illinois are the Shropshire, Hampshire, Southdown, and Oxford.

Poultry.—The raising of poultry and the production of eggs is an important branch of Illinois agriculture reported from 94 per cent of all the farms of the state. Chickens constitute 96 per cent of the total number of fowls. Other fowls reported were turkeys, ducks, geese, guinea fowls, pigeons, peafowls, and pheasants. The value of the poultry raised and the eggs produced during the year 1909 was \$34,000,000, one-fourth the value of all domestic animals sold and slaughtered in Illinois, five times the value of the entire potato crop of the state, 90 per cent of the value of the wheat crop, and nine times the value of the orchard fruits of the state. The map on page 187 shows that poultry are rather evenly distributed throughout Illinois with a slight increase in density in a belt extending across the south-central part of the state.

Numerous breeds of chickens are found in Illinois, among them the White Wyandotte, Speckled Wyandotte, Barred



YORKSHIRE HOGS, UNIVERSITY OF ILLINOIS

The Yorkshire is one of the best types of "bacon hogs." (Copyright by Keystone View Company.)



PRIZE HOLSTEINS, SHOWING IDEAL WATERING PLACE, BARNS, AND SILOS, NEAR QUINCY

Holsteins are larger milk producers than other breeds of dairy cattle. This fine herd is on the farm of the Illinois Soldiers' and Sailors' Home. (Copyright by Keystone View Company.)



SHEEP NEAR TOULON, STARK COUNTY

Plymouth Rock, White Plymouth Rock, Buff Cochin, White Orpington, Buff Orpington, and White Brahma. The Pekin duck, Indian Runner duck, and White Toulouse goose are favorite breeds of ducks and geese.



SHEARING SHEEP WITH POWER-DRIVEN SHEARS, KIRKLAND, DE KALB COUNTY

Sheep, shipped from the far West, are unloaded and fed at Kirkland, then sheared before being sent to the Chicago stockyards. (Copyright by Keystone View Company.)

Production by counties.—A comparison of farm crops and domestic animals by counties does not give a correct idea of the relative importance of the products within the counties, because of the varying sizes of counties. The largest county of the state has an area more than six times as large as the smallest. The larger counties appear in such lists oftener than the

TABLE II

NUMBER OF ANIMALS ON FARMS IN LEADING COUNTIES OF ILLINOIS

RANK	COUNTY	NUMBER	RANK	COUNTY	NUMBER
Horses			Mules		
1....	McLean	40,208	1....	St. Clair	4,911
2....	La Salle	36,569	2....	Madison	4,354
3....	Livingston	34,302	3....	Christian	3,758
4....	Iroquois	33,436	4....	Sangamon	3,612
5....	Champaign	30,926	5....	Jefferson	3,403
6....	Bureau	26,549	6....	Montgomery	3,375
7....	Sangamon	26,099	7....	Williamson	3,281
8....	Vermilion	26,021	8....	Jackson	3,280
9....	Fulton	25,993	9....	Saline	3,090
10....	Henry	24,753	10....	Macoupin	2,934
		State total... 1,687,516			State total... 138,671
All Cattle			Hogs		
1....	McHenry	77,477	1....	Fulton	153,253
2....	Ogle	57,736	2....	Henry	149,967
3....	Whiteside	57,663	3....	Adams	131,528
4....	Henry	57,438	4....	Mercer	116,884
5....	Kane	57,030	5....	Knox	109,678
6....	Jo Daviess	55,625	6....	Bureau	108,297
7....	Stephenson	54,323	7....	McDonough	105,079
8....	Bureau	53,210	8....	Sangamon	105,064
9....	Lee	48,490	9....	Pike	104,952
10....	Fulton	47,293	10....	Warren	103,695
		State total... 2,517,832			State total.... 4,757,335
Sheep			Poultry		
1....	Macoupin	42,266	1....	Livingston	403,624
2....	Pike	39,344	2....	Macoupin	398,602
3....	Jo Daviess	32,520	3....	Iroquois	388,432
4....	Adams	31,223	4....	McLean	386,048
5....	Wayne	26,591	5....	Madison	384,559
6....	Shelby	25,816	6....	La Salle	380,779
7....	McLean	22,972	7....	Fayette	373,854
8....	Sangamon	21,941	8....	Shelby	348,875
9....	Stephenson	21,621	9....	Wayne	348,488
10....	Hancock	20,939	10....	Montgomery	347,674
		State total... 1,090,915			State total.... 21,409,835

importance of the product in that county warrants, and the smaller counties do not appear at all, although the proportion of land devoted to the product and the yield per acre or per square mile may be very large. Such a list is of interest, however. The counties are given in the foregoing table in the order of the number of animals on farms according to the census returns of 1910. The table also gives a summary for the state, including the animals on farms and not on farms.

Summary.—The distribution of the animal industries of Illinois is a response to topography, soil, climate, crops, and distance to markets. The fact that topography, soil, and climate favor development of general farming throughout the state leads to a state-wide production of staple crops. This in turn requires the raising of domestic animals for the purpose of both the production and the consumption of these crops. This again leads to an evenness of distribution of all the domestic animals not to be found in a state with great contrasts of topography, rainfall, and temperature. Distance from the great market at Chicago for crops, animals, and animal products leads to interesting variations in the distribution of live stock and live-stock products which have already been pointed out.

CHAPTER XIII

MINERAL RESOURCES

Minerals of Illinois.—Somewhat more than a thousand minerals make up the rocks of the world, about one hundred forming the larger part of the common rocks. Ninety-one of these minerals have been found in larger or smaller amounts in the solid



HUNDREDS OF TONS OF COAL READY FOR SHIPMENT, HARRISBURG, SALINE COUNTY

Southern Illinois coal is of excellent quality and usually sells for a somewhat higher price than coal produced farther north in the state. (Copyright by Keystone View Company.)

rocks and glacial drift of Illinois. Specimens of nearly all of these Illinois minerals are displayed in the State Museum at Springfield. About a dozen of these minerals are found in the rocks of Illinois in commercial quantities and constitute the valuable mineral resources of the state. The value of these minerals produced in 1917 ranged from \$162,000,000 for coal to \$5,900 for silver, with a total value of \$238,000,000.

Importance of mineral resources.—Illinois ranks third among the states in the value of annual mineral production. The following table is based on mineral values for 1915:

TABLE I.

Pennsylvania.....	\$ 460,000,000
West Virginia.....	135,000,000
Illinois.....	115,000,000
Ohio.....	105,000,000
California.....	97,000,000
Total for the leading five states.....	\$ 912,000,000
Total for the United States.....	2,400,000,000

Thus Illinois produces about 5 per cent of the total mineral values of the United States. The value of the mineral products of Illinois in 1915 was three times the value of the total silver

TABLE II

MINERAL PRODUCTION OF ILLINOIS, 1915

Product	Quantity	Value
1. Coal.....	58,829,576 tons	\$ 64,622,471
2. Pig iron.....	2,455,894 tons	34,207,901
3. Petroleum.....	19,041,695 bbls.	18,655,850
4. Clay products (manufactured).....		14,791,938
4a. Clay (raw).....	163,904 tons	169,320
5. Coke.....	1,686,998 tons	7,016,635
6. Cement.....	5,553,164 bbls.	4,928,679
7. Stone.....		2,907,410
8. Sulphuric acid.....		2,046,311
9. Sand and gravel.....	7,708,012 tons	1,984,569
10. Zinc.....	5,534 tons	1,372,432
11. Asphalt.....	188,575 tons	1,041,378
12. Tripoli.....	23,756 tons	502,937
13. Fluor spar (1914).....	73,811 tons	426,063
14. Lime.....	88,604 tons	352,954
15. Natural gas.....		350,371
16. Lead.....	954 tons	89,676
17. Mineral water.....	1,559,489 gals.	75,290
18. Pyrite.....	14,849 tons	22,476
19. Silver.....	3,864 oz.	1,959
20. Miscellaneous.....		2,261,215
Total value, omitting pig iron, coke, and all duplications.....		\$114,704,587

production of the United States; it exceeded the gold output of the United States, including Alaska, by \$14,000,000; it was greater than the total value of the mineral products of 21 states

having the smaller output of minerals. Minerals are the most valuable of the primary resources of Illinois except the products of the soil.

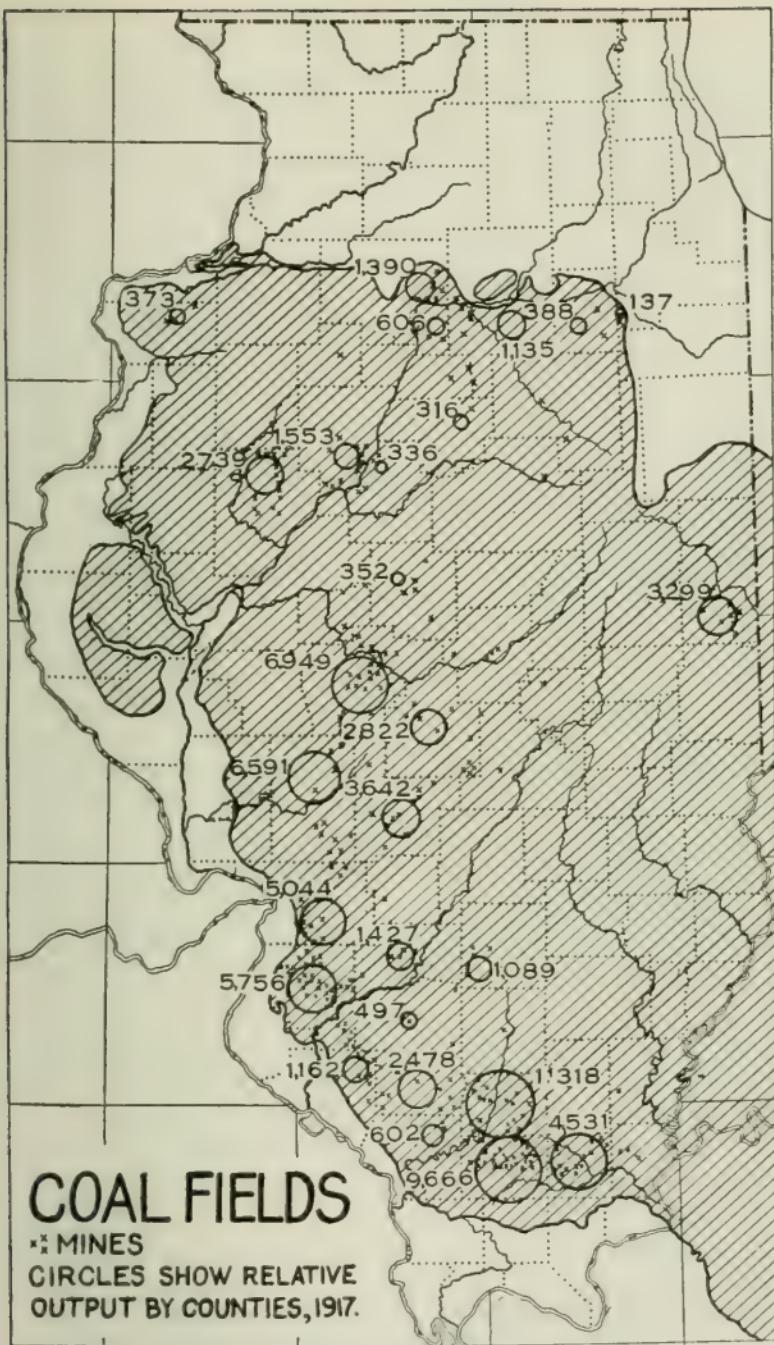
The foregoing table (II) of the mineral products of Illinois for 1915 shows the variety, amount, and value of the minerals

TABLE III
MINERAL PRODUCTION OF ILLINOIS, 1917

Product	Quantity	Value
Coal.....	86,199,387 tons	\$162,281,822
Pig iron.....	3,458,126 tons	91,094,541
Petroleum.....	15,776,860 bbls.	31,358,069
Clay products (manufactured).....		19,565,420
Clay (raw).....	188,616 tons	632,383
Coke.....	2,289,833 tons	14,455,539
Cement.....	4,378,233 bbls.	6,090,158
Stone.....		3,322,041
Sulphuric acid.....		3,902,831
Sand and gravel.....	9,120,698 tons	3,658,799
Zinc.....	4,267 tons	870,468
Asphalt.....	110,756 tons	1,317,855
Tripoli.....	16,133 tons	31,338
Fluor spar.....	156,676 tons	1,373,333
Lime.....	83,409 tons	529,451
Natural gas.....		479,072
Natural-gas gasoline.....	4,934,009 gals.	866,033
Lead.....	1,439 tons	247,508
Mineral water.....	1,370,461 gals.	66,042
Pyrite.....	24,596 tons	89,998
Silver.....	7,186 fine oz	5,931
Quartz (Silica).....	386,866 tons	630,256
Mineral paints.....		9,465,176
Miscellaneous.....		867,892
Total value, omitting pig iron, coke, and all duplications.....		\$238,186,690
Increase over 1915.....		\$124,482,103
Increase (per cent).....		108

of the state. The table for 1917 shows, in comparison with 1915, the influence of war activities on production and value of important minerals.

Coal.—The first discovery of coal in the United States was made in Illinois near Ottawa, La Salle County, by Father Hennepin, one of the early explorers, in 1679. Coal was first



MAP SHOWING COAL FIELDS OF ILLINOIS

Two-thirds of Illinois is underlain by coal. The amount of coal in Illinois exceeds that of any other state east of the Mississippi.

mined in Illinois for commercial purposes in 1810 along the bluffs of the Big Muddy River in Jackson County. This first shipment of Illinois coal was made on a flatboat on the Big Muddy and Mississippi rivers to New Orleans. In 1832 several boat loads were shipped to the same market. In 1833, 6,000 tons of coal were mined in St. Clair County and carried by wagons to St. Louis. The coal industry of St. Clair County induced the building of the first railroad in Illinois and the first west of the Allegheny Mountains. The cars were drawn by animal power. The *Annual Coal Report* of the State Department of Mines and Minerals gives complete data concerning the coal industry of the state. In 1864 the annual output was 1,000,000 tons; in 1871 it had reached 3,000,000 tons. This amount was doubled in nine years with a production of 6,000,000 tons in 1880. The output was again doubled in the short space of three years with 12,000,000 tons in 1883. In seven years more the annual production was again doubled with 25,000,000 tons in 1900. During the next eleven years the doubling process was again accomplished with an output of 50,000,000 tons in 1911. In the seven years following 1911 the increase has been 80 per cent, with a production of 90,000,000 tons in 1918. So marked was the influence of war demands on the output of Illinois coal that the production for the year ending June 30, 1917, was 24 per cent greater than that of the previous year, and the production for the year ending June 30, 1918, was 11 per cent greater than for 1917, an increase of 85 per cent over the output of 1910, and $3\frac{1}{2}$ times the output of 1900.

Illinois ranks third among the coal-producing states. Pennsylvania ranks first with a production of 46 per cent of the total, followed by West Virginia with 14 per cent, Illinois with 11 per cent, and Ohio with 4 per cent of the total.

Two-thirds of Illinois is underlain by beds or "veins" or "seams" of bituminous coal. The coal area of the state lies south of an east-west line joining Rock Island and Joliet, and is connected with the coal fields of southwestern Indiana and western Kentucky.

It is estimated that the original coal beds of Illinois contained more than 200,000,000,000 tons of coal. The amount mined from 1833 to 1917 is 1,212,000,000 tons. During the

last 10 years of this period 577,000,000 tons were produced, almost as much as during the preceding 75 years.

About 1 per cent of the total coal supply of the state has been exhausted in 85 years, including the coal which could not be recovered in the mining. With the tremendous rate of increase in output by years and by decades, the coal supply will be used much more rapidly in the future than in the past. Illinois has a larger known coal reserve than any other state in which the coal fields are well surveyed, probably twice as great as that of Pennsylvania, where the present annual output of coal is four times that of Illinois. The United States contains more coal than the rest of the world. Illinois contains about 10 per cent of the coal of the United States. Another 85 years of coal mining in Illinois will develop problems of production and consumption of coal not yet fully appreciated.

The 79,000,000 tons of coal mined in Illinois in the year ending June 30, 1917, came from 51 counties and 810 mines. The 324 "shipping" mines produced 98 per cent of the total, the remaining 2 per cent coming from 486 "local" mines. The average production of the shipping mines was 238,000 tons; that of the local mines 3,200 tons. The production of 266 mines was under 1,000 tons each; 139 mines each produced more than 200,000 tons. The coal-mining operations of 1917 required the labor of 80,893 men; 96 per cent of these were employed in the shipping mines; 70 per cent of all the men were employed in the 139 mines whose production exceeded 200,000 tons each, and the output of these 139 mines was 78 per cent of the total for the state.

The production of coal by counties for the year ending June 30, 1917, is shown on the map (p. 201). The numbers are given in thousands of tons and, in reading, three "ciphers" (000) must be added to each number.

Of the 810 coal mines of the state, 480 are shaft mines, 204 are drift mines, and 126 are slope mines. There are 779 mines worked by the "pillar and room" method; 23 by the "long wall" method; and 8 by the "strip" method. The electric motor is rapidly displacing other methods of underground haulage in the large shipping mines. In 1907 underground haulage was carried on in 75 shipping mines by motor, 26 by cable,

503 by mule, and 5 by hand. Ten years later, in 1917, 200 shipping mines used the electric motor, 51 the cable, 113 the



COAL TRANSPORTATION UNDERGROUND BY ELECTRIC MOTOR, MARION, WILLIAMSON COUNTY
(Copyright by Keystone View Company)

fifth of the production of the state, to 47,000,000 tons, or three-fifths of the total.

Depth of mine, thickness of seam, and production per mine vary greatly. In the "strip" mines the overlying soil is removed and the coal taken from the surface. Drift and slope mines may be only a few feet below the surface of the earth. In McDonough County there are 48 mines; 10 are shaft mines, 4 are slope mines, and 34 are drift mines. The depth of coal below the surface varies from 22 feet to 70 feet. The thickness of the worked coal seams varies from 1 foot 8 inches to 2 feet

mule, and 1 was operated by hand. Machine mining is also having a rapid development. In 1900, 38 mines were operated exclusively and 29 in part by machines; in 1917 these numbers had increased to 98 and 53 respectively. The number of machines increased during this period from 430 to 1,920 and the amount mined by machines from 5,500,000 tons, or one-



STRIPPING COAL, SURFACE MINING WEST OF DANVILLE, VERMILION COUNTY

Where coal beds lie near the surface, the overlying earth is removed, and the coal taken out as from an open quarry. (Copyright by Keystone View Company.)

mines. The depth of coal below the surface varies from 22 feet to 70 feet. The thickness of the worked coal seams varies from 1 foot 8 inches to 2 feet

8 inches. The production per mine varies from 10 tons to 2,440 tons. The total output of the 48 mines is 17,606 tons. Thus while McDonough County has 6 per cent of the mines of the state, the coal production is a very small fraction of 1 per cent. Franklin County has 21 mines; all are shaft mines; the depth of the mines varies from 152 feet to 730 feet; the thickness of the worked coal seams from 6 feet 6 inches to 14 feet; and the output per mine from 45,000 tons to 1,093,000 tons. Franklin County has $2\frac{1}{2}$ per cent of the mines of the state



COAL MINE, MOUNT OLIVE, MACOUPIN COUNTY

Coal is lifted in small cars by means of elevators to the top of the shafthouse, dumped into chutes, and distributed by gravity.

TABLE IV
COUNTIES PRODUCING MORE THAN 1,000,000 TONS OF COAL FOR THE YEAR
ENDING JUNE 30, 1917

Rank	County	Tons	Percentage of State	Men Employed
1.....	Franklin	11,317,657	14.30	10,511
2.....	Williamson	9,666,302	12.23	9,294
3.....	Sangamon	6,948,648	8.79	6,762
4.....	Macoupin	6,590,825	8.34	5,384
5.....	St. Clair	5,755,650	7.28	5,360
6.....	Madison	5,044,261	6.38	4,246
7.....	Saline	4,530,903	5.73	4,817
8.....	Montgomery	3,641,676	4.61	3,576
9.....	Vermilion	3,299,419	4.17	3,232
10.....	Christian	2,822,167	3.57	2,750
11.....	Fulton	2,739,185	3.46	3,208
12.....	Perry	2,477,561	3.13	2,551
13.....	Peoria	1,553,455	1.96	1,700
14.....	Clinton	1,426,594	1.80	1,401
15.....	Bureau	1,390,552	1.76	2,537
16.....	Randolph	1,162,468	1.47	1,275
17.....	La Salle	1,134,584	1.43	2,019
18.....	Marion	1,088,619	1.37	1,045
Total, 18 counties.....		72,600,525	91.78	71,468
Total, other counties.....		6,383,002	8.22	9,425
Total, state.....		78,983,527	100.00	80,893

and produces 14 per cent of the coal. The deepest mine in Illinois, 1,004 feet, is at Assumption, Christian County. Five counties—Bond, Cass, Jersey, Moultrie, and White—have but one mine each. In each of three counties there are more than 50 mines; Peoria has 60, St. Clair 63, and Fulton 93. The 324 shipping mines are found in 38 counties. One mine in Peoria

TABLE V

COUNTIES PRODUCING MORE THAN 1,000,000 TONS OF COAL FOR THE YEAR
ENDING JUNE 30, 1918

Rank	County	Tons	Percentage of State	Men Employed
1.....	Franklin	12,007,397	13.34	11,618
2.....	Williamson	11,655,101	12.95	9,979
3.....	Sangamon	8,155,734	9.06	7,731
4.....	St. Clair	7,868,449	8.75	6,898
5.....	Macoupin	7,095,366	7.89	5,804
6.....	Saline	5,670,832	6.30	6,541
7.....	Madison	5,188,768	5.77	4,731
8.....	Montgomery	4,340,675	4.82	4,114
9.....	Vermilion	3,971,330	4.41	3,816
10.....	Christian	3,221,234	3.58	3,026
11.....	Perry	2,937,237	3.27	2,937
12.....	Fulton	2,792,950	3.11	3,733
13.....	Randolph	1,599,718	1.78	1,657
14.....	Peoria	1,483,486	1.65	1,724
15.....	Clinton	1,429,569	1.60	1,322
16.....	Bureau	1,350,890	1.50	2,467
17.....	La Salle	1,198,360	1.33	2,056
18.....	Marion	1,116,289	1.24	1,159
Total, 18 counties.....		83,083,385	92.35	81,313
Total, other counties.....		6,896,084	7.65	10,059
Total, state.....		89,979,469	100.00	91,372

County shipped its production of 25,000 tons by boat on the Illinois River. The 323 other shipping mines disposed of their coal by shipment over 37 different railroads. The Illinois Central served 89 mines in 21 counties, carrying 10,000,000 tons, 19 per cent of the 53,000,000 tons shipped in the state. The Chicago, Burlington, and Quincy Railroad served 51 mines in 11 counties, carrying 9,800,000 tons, or 18 per cent of the total. The "Big Four" Railroad served 37 mines in 10 counties and carried 12 per cent of the total. The Chicago and Eastern

Illinois Railroad served 33 mines in 6 counties and carried nearly 10 per cent of the total.

The great coal reserves of Illinois, the developed mines, and the central location of the state assure an industrial development in the future not to be surpassed by any other state.

Tables IV, V, and VI show many facts of interest concerning the coal production in Illinois.

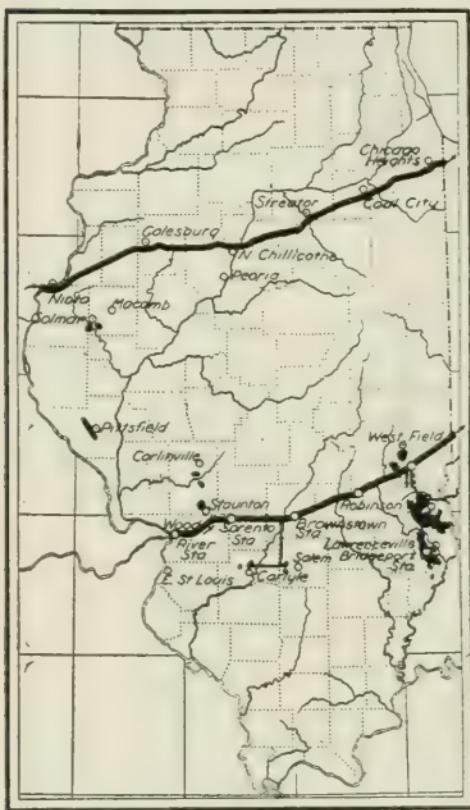
TABLE VI

COAL PRODUCTION, FIVE-YEAR PERIODS, WITH RECENT ANNUAL
PRODUCTION

Year	Counties	Mines	Number of Men	Tons	Increase Production Percentage
1885....	50	778	25,946	11,834,459	.....
1890....	57	936	28,574	15,274,727	29
1895....	54	855	38,630	17,735,864	16
1900....	52	920	39,384	25,153,929	42
1905....	56	990	59,230	37,183,374	48
1910....	55	881	74,634	48,717,853	31
1915....	52	779	75,607	57,601,694	18
1916....	51	803	75,919	63,673,530	10
1917....	51	810	80,893	78,983,527	24
1918....	54	967	91,372	89,979,469	11

Petroleum and natural gas.—The Illinois oil fields of Clark, Crawford, and Lawrence counties are associated with the La Salle anticline, an upward fold of bedrock which crosses Illinois from Stephenson County in the northwest to Lawrence County in the southeast. The La Salle anticline crosses the Illinois River at Split Rock between La Salle and Utica. South of La Salle County this rock fold does not appear at the surface, but exists deep underground, and in the oil fields it forms the cap or covering for the oil-bearing rocks. The petroleum has accumulated under the anticlinal fold, and is obtained by penetrating the impervious rocks of the anticline by deep wells from which the oil is pumped to the surface. Small anticlinal folds exist deep underground elsewhere in the state, and some of them confine petroleum and natural gas beneath. The regions of the state where petroleum and gas

have been found are shown on the accompanying map. The important commercial output is in southeastern Illinois, and the total productive area is about 250 square miles, or 160,000 acres, an area equivalent to 1,000 farms of 160 acres each.



PETROLEUM FIELDS AND PIPE LINES OF ILLINOIS

The productive area of petroleum in Illinois amounts to about 250 square miles or less than $\frac{1}{2}$ of 1 per cent of the area of the state. Two pipe lines cross the state from the oil fields of Kansas, Oklahoma, and Texas to refineries farther east than Illinois. Whiting, Indiana, is an important refining center for the northern line, and Wood River, Illinois, for the southern line.

the oil being procured at depths of 800 to 1,900 feet.

Table VII shows the progress of the oil-producing industry of Illinois.

Production increased rapidly from 1904 to 1908 and it has declined slowly since 1911. The oil industry has aided in the

Prospecting for oil began in Clark County in 1865, only six years after the first successful wells of Pennsylvania had been opened. Some oil was obtained, but not enough to induce further development at that time. Thirty-nine years later, in 1904, successful wells were drilled, and the region which had been tested in 1865 was a fair producer for several years. These were shallow wells having a depth between 400 and 600 feet.

In 1906 the Crawford County field was opened, and the oil industry of Illinois took on large proportions immediately. The oil in this field is found at depths of 750 to 1,000 feet.

In 1907 the Lawrence County field was opened;

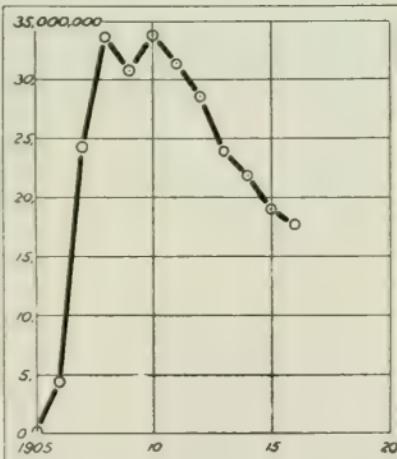
development of a number of cities in the district, among which are Robinson and Oblong in Crawford County, Lawrenceville

TABLE VII
PRODUCTION OF PETROLEUM, ILLINOIS AND UNITED STATES

RANK OF ILLINOIS	YEAR	BARRELS OF 42 GALLONS		ILLINOIS PERCENTAGE
		Illinois	United States	
	Prior to			
	1905	6,576	429,301,612	.....
	1905	181,084	134,717,580	0.1
	1906	4,397,050	126,493,936	3.4
3	1907	24,281,973	166,095,335	14.6
3	1908	33,686,238	178,527,355	18.8
3	1909	30,898,339	183,170,874	16.8
3	1910	33,143,362	209,557,248	15.8
3	1911	31,317,038	220,449,391	14.2
3	1912	28,601,308	222,935,044	12.8
3	1913	23,893,899	248,446,230	9.6
3	1914	21,919,749	265,762,535	8.2
4	1915	19,041,695	231,104,104	6.7
4	1916	17,714,235	300,767,158	5.8
Total	.....	269,082,546	3,917,328,402	6.8

and Bridgeport in Lawrence County. A large refinery has been established at Lawrenceville. Owners of some farms have been enriched by many times the original value of their holdings.

Natural gas has been found in limited quantities in connection with petroleum. Small quantities of gas have been found where the oil was not obtained in commercial quantities, and in some places where no oil appeared. Usable quantities of natural gas have been found in the glacial drift where gas had accumulated under impervious layers of clay. Gas wells have usually given out



PRODUCTION OF PETROLEUM IN ILLINOIS

Production is indicated in barrels

after producing for six or seven years. The small local supplies have frequently been used on the farms on which produced.

Gas has been found chiefly in Montgomery, Pike, Randolph, and Macoupin counties.

Pig iron and coke.—

Pig iron and coke are mineral products of great value in Illinois. They do not figure in the value of mineral products of the state, however, as pig iron is made from iron ore shipped in from other states, and coke is made



IRON-ORE DOCK AND STORAGE, CALUMET HARBOR, CHICAGO

More than seven million tons of iron ore are received annually at Calumet Harbor.

from coal, which is a primary mineral resource. The steel plants at South Chicago and Joliet produce the pig iron of the state. Coke is produced as a by-product in gas-manufacturing plants in various cities. It is also manufactured in the coke ovens of the steel plants to be used in the manufacture of steel.

Clay products.—

Throughout the glaciated regions of Illinois, clay suitable for making brick and tile is found. Clays suitable for pottery and sewer pipe are found in more restricted areas. Brick and tile factories are therefore widely scattered throughout the state in order to avoid high transportation charges. Whitehall in Greene County, Macomb



GLAZING-ROOM OF WESTERN STONWARE COMPANY, MACOMB, M'DONOUGH COUNTY

In the glazing-room the various pottery products are dipped into a special liquid preparation which gives the smooth, shiny surface to the article. The glaze is applied just before the pottery is placed in the kilns for firing. (Copyright by Keystone View Company.)

Brick and tile factories are therefore widely scattered throughout the state in order to avoid high transportation charges. Whitehall in Greene County, Macomb

in McDonough County, and Monmouth in Warren County are important centers for pottery and sewer pipe. Brick and tile constitute 93 per cent of the clay manufactures of the state and pottery 7 per cent. Cook County makes more common brick than any other county of the United States, producing three-fourths of the brick of Illinois. Knox County leads in the manufacture of vitrified brick for paving purposes, with Livingston County second. Vermilion County leads in the production of front brick, and Kankakee is the only county producing enameled brick.

La Salle County leads in the production of draintile, fireproofing, and fire brick. Cook County is the largest producer of terra cotta. McDonough County is the leading county in the production of sewer pipe. A large variety of stoneware constitutes the chief pottery product of the state, with Warren and McDonough as the leading counties.

Every kind of clay product classified in the *Mineral Resources of the United States* is produced in Illinois except china. Illinois ranks first among the states in the value of common brick; second in the value of paving brick, of terra cotta, and stoneware; third in brick and tile products and in enameled brick; fourth in the value of all clay products and in front brick and draintile; fifth in sewer pipe and fireproofing.

Cement, stone, sand, and gravel.—Illinois ranks third among the states in the production of cement, being surpassed by Pennsylvania and Indiana. Prior to 1900 the output of natural cement in the United States exceeded that of Portland



REFINING ROOM, MACOMB, M'DONOUGH COUNTY

The raw clay is thoroughly washed and cleaned of all its impurities in the refining process whereby it is prepared for molding into pottery.

cement. In 1900 the output for each kind of cement was 8,000,000 barrels. In 1915 the production of natural cement had declined to 750,000 barrels and the output of Portland cement was 85,000,000 barrels, or ten times as great as in 1900. Of the twelve plants still producing natural cement in the United States in 1915, one is located in Illinois near Utica in La Salle County, where it makes use of the Lower Magnesian limestone, the oldest stratified rock outcropping in the state. Important

centers of Portland-cement manufacture are Oglesby and La Salle in La Salle County, and Dixon in Lee County; while a new plant has been recently erected at Golconda in Pope County. At these centers abundant limestone and shale of proper quality for cement lie near the surface and can be readily quarried. So abundant and so widely distributed are the raw materials for Portland cement that its increased use for structural work will tend to



QUARRY AND MILL FOR CRUSHING LIMESTONE,
THORNTON, COOK COUNTY

The extensive beds of Illinois limestones furnish rock for road metal, railroad ballast, fertilizer, and lime. Large crushers with heavy machinery are necessary to prepare the rock for its various uses.

conserve the more limited supplies of wood and iron.

Limestone is the chief product of Illinois stone quarries. About 75 per cent of the output is used as crushed stone for concrete road metal and railroad ballast. Lime used for mortar in building operations is made from limestone, and increasing quantities of fine-ground limestone are being used for soil improvement throughout the state, more especially in the southern counties, where the soils are more acid than elsewhere. Illinois limestone is also used as flux in blast furnaces for smelting iron, for riprap, rubble, and in a small measure for building stone.

Sand and gravel are found in places in the glacial moraines, in the valley trains leading out from the moraines, along streams, and along the lake shore. The sand produced in Illinois is used mainly for building purposes. Other uses are for glass manufacture, molding, paving, and for locomotives. Glass sand is obtained largely from the St. Peter sandstone along the bluffs of the Illinois River in the vicinity of Ottawa. It forms the basis of important glass and bottle factories at Ottawa and Streator. Gravel is widely used for concrete and for road-building.

Sulphuric acid and pyrite.—The many uses for sulphuric acid, especially in the manufacture of munitions of war, has led to a rapid expansion of this industry in the years during the war. The value of the sulphuric acid manufactured in Illinois in 1915 was \$2,000,000, or about 7 per cent of the total of the United States. The production of 1917 was valued at \$4,000,000. It is obtained as a by-product in the smelting of zinc and lead, or it may be manufactured directly from sulphur or from *pyrite*, which is made up of sulphur and iron. Illinois ranks fourth among the states in the amount of pyrite produced. Pyrite in Illinois comes from the coal mines. The production is made up of small quantities from many mines, the chief supply coming from mines in Vermilion and Madison counties.

Zinc, lead, and silver.—The lead and zinc mines near Galena, in Jo Daviess County, brought about an earlier settlement of the northwest corner of the state than any other region between the Illinois and Mississippi rivers. Galena was better known to the world for a few years than Chicago. The lead and zinc ores, accompanied by minute quantities of silver, come from the same ore bodies. At first lead was the important product. Now zinc is far more valuable than the lead, and the small silver output of the state is a by-product of the zinc industry. The production in Illinois and elsewhere has been greatly stimulated by the war demands. The zinc mines are found in the Driftless Area of Illinois and Wisconsin; the Wisconsin product is about 7 times as great as that of Illinois. The Illinois product of zinc is about 2 per cent of the total for the United States. Missouri leads in output with more than

all the other states combined. Illinois produced, in 1915, 316,000 tons of crude ore from which was made 5,534 tons of zinc "spelter," as the refined product is called.

While Illinois produced only 2 per cent of the 16,000,000 tons of zinc of the United States as a mine product, the zinc smelters of the state turned out 159,958 tons of zinc spelter, the largest output of any state, and 33 per cent of the total for the United States. One of the first zinc smelters in the United States was located in 1858 at La Salle, on the north edge of the Illinois coal fields nearest to the Jo Daviess County lead and zinc mines, where railroad, canal, and river transportation were at hand at that early date.

It takes so much coal to smelt zinc that it is cheaper to ship the zinc ore to the coal fields than to ship the coal to the

zinc mines. For this reason the cheap and abundant coal supply of Illinois has led to the development of zinc smelters at La Salle, Peru, Depue, Springfield, Hillsboro, East St. Louis, Collinsville, Sandoval, and Danville. Thus Illinois, because of coal resources, remains a leading state in zinc

FLUOR-SPAR MINES, ROSICLARE, HARDIN COUNTY

smelting, although long ago the center of ore production shifted to other states. The \$89,000 worth of lead and the nearly \$6,000 worth of silver produced by the state are by-products of the zinc mines.

Fluor spar, tripoli, and other mineral products.—Illinois produces more than 75 per cent of the fluor spar of the United States, and this output comes from the fluor-spar mines of Rosiclare, a river port on the Ohio River in Hardin County. The ore is sent by boat down the Ohio to Golconda or up the Ohio to Shawneetown, where it is loaded on railroad cars and shipped widely throughout the country. Fluor spar or "fluorite" is used as a flux in smelting iron. It is also the source of



hydrofluoric acid, which is employed for etching glass and in the manufacture of opalescent glass.

The material called *tripoli* is a white, or yellowish, light, porous siliceous rock. Illinois produced 77 per cent of the tripoli of the United States in 1915. Some tripoli is used as an abrasive, but most of it is worked into filter blocks. The Illinois tripoli is also used in paint, wood filter, metal polish, in soaps, in cleansers, for making glass, tile, and enamel, and for facing foundry molds.

The *asphalt* produced in Illinois is a by-product of the oil refineries. It finds a larger use in street paving than elsewhere.

The *mineral waters* of Illinois were produced from 23 commercial springs, and sold at an average price of 5 cents per gallon. About 93 per cent was sold as table waters and 7 per cent as medicinal waters.

S u m m a r y.—The coal of Illinois is of greater value than all other mineral resources combined, and it is likely to remain so. In 1915 the value of coal constituted 56 per cent of the total value of the mineral output. With the entrance of the United States into the world-war and its stimulating effect on production and price of coal, this percentage of value increased to 68 per cent in 1917. Coal, petroleum, and natural gas are the mineral fuels and petroleum is the chief supply of lubricating oils. These three mineral products, once used, can never be replaced. Since the supply is limited every effort should be made to use them to the best advantage and without waste in production or consumption. Mineral resources obtained from an unlimited supply should be used where they serve as well and are as cheap as materials which are limited in amount. Limestone and shale, used in the manufacture of Portland cement, sand, gravel, and crushed rock, are among the mineral



ARTESIAN WELL, POTOMAC, VERMILION COUNTY

Artesian wells of moderate depth furnish flowing water on many farms near Potomac.

resources of this class. Illinois is fortunate in having so many mineral resources in sufficient quantities to supply her own needs, and, in some cases, a surplus to send to other states. The favorable location of Illinois with reference to the abundant iron ore of the Lake Superior district and the lead and zinc ores of the Missouri district enables her to build up great industries in these fields of manufacture on or near her coal fields. The mineral resources of the state have enabled Illinois to take high rank among the states in population, manufacturing, transportation facilities, commerce, and wealth.

CHAPTER XIV

MANUFACTURING

Favorable conditions.—Illinois possesses superior advantages in the six factors necessary for the successful development of manufacturing industries: power, raw materials, capital, labor, transportation, markets.

Abundant and cheap power is necessary for manufacturing on a large scale. Although the surface of Illinois is quite flat, some valuable water-power sites have been developed. At Lockport the overflow of the Chicago Drainage Canal is utilized for light and power for Chicago and intermediate cities. The dam across the Illinois River at Marseilles in La Salle County furnishes power for a group of manufacturing plants and for an electric interurban railroad system. The great Keokuk Dam is built across the Mississippi River between Keokuk, Iowa, and Hamilton, Illinois, and a part of its power is available for use in Illinois.

The flour mill was one of the earliest manufactories to be established in Illinois. A mill at Golden, Adams County, is still in commercial operation with wind power. Small mills built in pioneer days have been kept in good repair and are in present use.

The great source of power, however, for Illinois, for present and future generations, is the 200,000,000,000 tons of coal



POWER DAM, MARSEILLES, LA SALLE COUNTY

The natural fall in the Illinois River at Marseilles of 18 feet in $1\frac{1}{2}$ miles makes this an important center of water-power development. (Copyright by Keystone View Company.)

underlying the central and southern parts of the state. Although Chicago, the chief center of manufacturing, is situated outside the coal-producing region, the distance to abundant coal resources is not great enough to interfere with the rapid growth of manufacture in this great commercial metropolis. Certain manufacturing industries, notably the zinc-smelting plants, have been located in the rich Illinois coal fields in order to have cheap and abundant fuel at their very doors.



GRIST MILL OPERATED BY WIND POWER,
GOLDEN, ADAMS COUNTY

This mill is operated at an exceedingly low cost for power and upkeep.

the live-stock regions of the central and western states. More than half the area of the United States makes important contributions to the raw materials of the factories of Illinois.

With a wealth estimated at \$15,000,000,000, or more than \$2,500 per capita, Illinois has large sums of money invested in profitable manufacturing enterprises, and additional capital awaits investment as opportunity affords.

A large supply of efficient labor exists in the cities of Illinois where, in 1910, 38.5 per cent of the population of the state

Raw materials for the factories of Illinois exist in abundance in regions located in all directions from the manufacturing centers, and they are carried promptly and cheaply by railroad trains and steamship lines. Illinois factories draw a large amount of raw materials from the farms of the state; they reach out to the forests of the northern, southern, and western states; to the iron-ore mines of the Lake Superior district; to the grain crops of the rich agricultural lands of the Mississippi Valley; to

lived in Chicago alone, 52.3 per cent in the 32 cities having a population of 10,000 or more, and 61.6 per cent in the 144 cities having a population of 2,500 or more. As additional labor is needed, the network of railroads radiating to all parts of the United States makes it easy for labor to reach Illinois from centers where conditions are less satisfactory.

Illinois is well situated for transportation on the Great Lakes. Large freight boats carry millions of tons annually of iron ore, grain, lumber, fruit, and package freight. Important lake traffic is carried on at Waukegan. Gary, Indiana, within the Chicago industrial district, is making increased use of the advantages of lake commerce. The great transportation facilities of Illinois, however, consist of numerous extensive and well-arranged railroad systems which serve all manufacturing centers of the state with connections to all parts of the country, wherever raw materials or markets may be found.

Illinois manufacturing centers are well situated to supply all markets. With the center of population for the United States in southwestern Indiana, Illinois is exceptionally well located to reach nation-wide markets. Lying at the center of the rich agricultural lands of the Mississippi Valley, it is in the midst of a region of large population, wealth, and purchasing power. Illinois and the states touching it have a population of 18,000,000 people, or about 20 per cent of the population of the United States.

With these favorable advantages for manufacturing, Illinois stands third in output of her factories, being exceeded



POURING ZINC SPELTER, MATTHIESEN & HEGELER
ZINC COMPANY, LA SALLE

(Copyright by Keystone View Company)

by New York and Pennsylvania, each of which has a larger population than Illinois.

Important industries.—The United States census report of manufactures for 1914 shows 121 different lines of industry in Illinois, each having an output valued at more than \$1,000,000.

Twenty-five of these, each producing a value of more than \$20,000,000, are shown in the accompanying graph. These 25 industries employ 66 per cent of the wage-earners of the state engaged in manufacturing, and produce 71 per cent of the value of the manufactured products of the state.

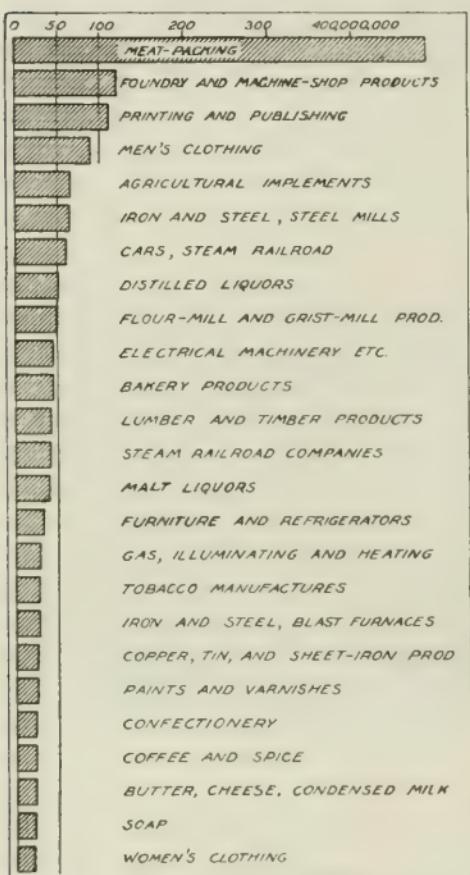


CHART SHOWING VALUE IN DOLLARS OF LEADING MANUFACTURING INDUSTRIES FOR ILLINOIS

The excess of the value of meat-packing products over other large industries is due to the relatively high cost of raw materials rather than to the value added by labor.

Meat-packing is the leading industry because Illinois, near the center of the corn belt, is also near the center of live stock production. The high value of the product of this industry is due not so much to the work involved, as to the high value of the live stock which forms the basis, or raw material, of the industry. Meat-packing gave employment in 1914 to 31,627 wage-earners,

6.2 per cent of the total for the state, while the value of the products amounted to 21.8 per cent of the total value of manufactured products of the state. Chicago produced 84 per

cent of the total value. Peoria and East St. Louis are other important centers of the industry.

The numbers of wage-earners engaged in the manufacture of foundry and machine-shop products was larger than the number engaged in any other industry, constituting a total of 55,261, or 10.9 per cent of the 506,943 wage-earners of the state. This industry produced 6.3 per cent of the total value of the manufactured products of the state, and added to the value of its raw materials a larger amount than any other industry.

The printing and publishing establishments numbered 2,722, a larger number than any other industry. They employed 32,838 wage-earners, a larger number than were engaged in meat-packing. The volume of the output of the printing and publishing industry amounts to about \$20 per capita for the entire population of the state.

The manufacture of men's clothing was carried on in 604 establishments by 35,119 wage-earners, 6.9 per cent of the total for the state, a larger number than engaged in any other industry except in the manufacture of foundry and machine-shop products.

Illinois is the leading state in the manufacture of agricultural implements. It produced more than one-third of the total value reported for the United States. In the early settlement of Illinois the improvement of agricultural machinery was stimulated by the fertility of the prairies, the difficulty of plowing the tough prairie sod, and the flat land inviting the



COOLING-ROOM, ARMOUR PACKING-HOUSE, CHICAGO

Because meat-packing can be done more economically in large packing-houses, the industry is concentrated in a relatively few large establishments. (Copyright by Keystone View Company.)

cultivation of large areas by means of labor-saving machinery. Frequent and important improvements led to rapid expansion of the industry in Illinois where raw materials were readily obtained and where an unlimited market awaited a better plow, harrow, cultivator, mower, and harvesting machine. The chief centers of manufacture for agricultural implements are Chicago, Moline, Rock Island, Peoria, and Canton.

There were 18,388 manufacturing establishments in Illinois in 1914. Four lines of manufacture were each conducted in more than 1,000 establishments as follows: printing and publishing, 2,722 establishments; bread and other bakery products, 2,278; tobacco manufacture, 1,622; foundry and machine-shop products, 1,371. In marked contrast with these industries in number of factories is the leading industry of the state, meat-packing, which from 98 establishments turns out one-fifth of the value of the manufactured product of the state. Other localization of manufactures within the state are shown by the following facts: 7 establishments manufactured in one year distilled liquors valued at \$51,000,000; 5 plants operating blast furnaces produced pig iron valued at \$25,000,000; 9 zinc smelters had an output valued at \$18,000,000; 9 petroleum refineries manufactured \$16,000,000 worth of products; 9 establishments manufacturing wire produced material valued at \$15,000,000; 3 coking plants had an output of \$7,800,000; 6 cement factories supplied a product valued at \$6,400,000.

Location of industries.—The requirements of labor and transportation facilities led to the concentration of manufacturing in large cities. Chicago, with 38.8 per cent of the population of the state in 1910, did 66.8 per cent of the manufacturing; 31 other cities having a population of 10,000 or over contained 13.5 per cent of the population and did 16.3 per cent of the manufacturing. The 112 smaller cities and villages of 2,500 or more inhabitants contained 9.3 per cent of the population of the state. These and still smaller places did 16.9 per cent of the manufacturing of the state.

In 1914 the number of cities having a population of 10,000 or more as estimated by the Census Bureau had increased to 36. The four cities added to the list were Centralia, Granite City, Kewanee, and Pekin. The census reports of 1914,

TABLE I
MANUFACTURES OF THIRTY-FIVE ILLINOIS CITIES, 1914

Rank in Value	City	Value of Product	Percentage of State	Average Number Wage-Earners
1.....	Chicago	\$1,483,498,416	66.0	313,710
2.....	Peoria	64,689,045	2.8	6,285
3.....	Joliet	30,091,415	1.3	4,999
4.....	East St. Louis	26,904,565	1.2	5,863
5.....	Rockford	26,371,219	1.1	10,472
6.....	Moline	19,925,106	.9	5,053
7.....	Granite City	17,903,162	.8	5,090
8.....	Chicago Heights	14,485,569	.6	4,288
9.....	Alton	12,864,532	.5	2,662
10.....	Waukegan	12,438,514	.5	2,276
11.....	Decatur	11,957,406	.5	4,003
12.....	Springfield	11,769,969	.5	4,157
13.....	Aurora	10,789,383	.5	4,777
14.....	Elgin	10,491,829	.5	5,529
15.....	Pekin	9,609,500	.5	634
16.....	Quincy	9,556,918	.5	3,067
17.....	Freeport	7,446,977	.4	2,566
18.....	Rock Island	6,487,859	.3	1,837
19.....	Belleville	5,727,269	.3	2,450
20.....	Kewanee	5,446,615	.3	2,837
21.....	Danville	5,291,160	.2	2,109
22.....	La Salle	5,245,780	.2	1,214
23.....	Bloomington	4,803,808	.2	2,384
24.....	Cairo	4,583,539	.2	1,522
25.....	Evanston	3,984,824	.2	924
26.....	Streator	3,886,617	.2	1,763
27.....	Kankakee	3,193,020	.1	1,430
28.....	Galesburg	3,192,129	.1	1,362
29.....	Canton	2,576,965	.1	920
30.....	Jacksonville	2,355,192	.1	932
31.....	Oak Park	1,555,083	.1	268
32.....	Mattoon	1,543,727	.1	735
33.....	Champaign	1,244,696	.1	382
34.....	Centralia	767,733	.1	237
35.....	Lincoln	560,637	.....	239
Total for 35 cities . . .		\$1,843,240,178	82.00	408,977
Total for rest of state . . .		404,082,641	18.00	97,966
Total for state		\$2,247,322,819	100.00	506,943

however, could not include statistics for Cicero without disclosing individual operations, and thus the reports were made in detail for 35 cities. These 35 cities contained 55 per cent of the estimated population of the state in 1914 and reported 82 per cent of the value of the manufactured products of the state.

The table on page 223 shows the relative importance of these 35 cities in manufacturing. The list is arranged in order of the value of the product.

The more important industries of these 35 cities are here shown in detail. The manufacture of distilled and malt liquors is now prohibited by national law.

1. Chicago: All the 25 leading industries mentioned on the graph, page 220, are largely developed in Chicago.

2. Peoria: (Distilled liquors); meat-packing; agricultural implements; paper and wood pulp; (malt liquors); cooperage.

3. Joliet: Steel works; rolling mills and blast furnaces; coke; wire.

4. East St. Louis: Flour-mill and grist-mill products; chemicals; meat-packing; rolling mills; foundry and machine shops; paints; railroad repair shops.

5. Rockford: Furniture; knitting mills; foundry and machine shops; agricultural implements; pianos; carriages and wagons; saddlery.

6. Moline: Agricultural implements; automobiles; carriages and wagons.

7. Granite City: Rolling mills; glucose; babbitt metal and solder; stamped and enameled ware; tin plate.

8. Chicago Heights: Steel works and rolling mills; foundry and machine-shop products; railroad car shops; chemicals.

9. Alton: Flour mills; glass factories; meat-packing.

10. Waukegan: Rolling mills; preparation of food products; leather.

11. Decatur: Railroad repair shop; plumbers' supplies; starch.

12. Springfield: Flour mills; boots and shoes; watches; zinc-smelting; agricultural implements; electrical machinery.

13. Aurora: Railroad repair shops; foundry and machine shops; corsets; builders' hardware.

14. Elgin: Watches; condensed milk.
15. Pekin: (Distilled liquors); glucose and starch; cooperage.
16. Quincy: Stoves and furnaces; (malt liquors); patent medicines; foundry and machine shops.
17. Freeport: Patent medicines; carriages and wagons; windmills; gas and gasoline engines.
18. Rock Island: Agricultural implements; lumber and planing-mill products.
19. Belleville: Stoves and furnaces; flour-mill and grist-mill products; (malt liquors); steam fittings.
20. Kewanee: Foundry and machine shops.
21. Danville: Cars and general shop construction; railroad repair shops.
22. La Salle: Zinc-smelting; cement.
23. Bloomington: Cars and general shop construction; railroad repair shops.
24. Cairo: Lumber and timber products.
25. Evanston: Iron and steel; wrought pipe.
26. Streator: Glass.
27. Kankakee: Cotton goods; hosiery and knit goods.
28. Galesburg: Cars and general shop construction; railroad repair shops; foundry and machine shops.
29. Canton: Agricultural implements.
30. Jacksonville: Meat-packing; men's clothing; structural iron-work.
31. Oak Park: Gas, illuminating and heating.
32. Mattoon: Cars and general shop construction; railroad repair shops.
33. Champaign: Printing and publishing; gas, illuminating and heating.
34. Centralia: Envelopes.
35. Lincoln: Undertakers' goods.

An examination of this list in connection with the list of cities arranged in order of population, page 311, reveals the fact that the importance of a city as a manufacturing center does not necessarily correspond to its population. Granite City, a strictly industrial center, ranks seventh in the value of manufactures and twenty-sixth in population; Oak Park, a

residential suburb of Chicago, ranks thirty-first in value of manufactures and sixteenth in population; Moline ranks sixth in manufactures and fifteenth in population; Pekin ranks ninth in manufactures and thirty-sixth in population.



HOME OF AVERY TRACTORS, PEORIA

The Avery Company sends its tractors to all parts of the United States and to many foreign countries. Their tractors saw active service on the battle fields of the Great War.

manufactured 99.2 per cent of the soap of the state, 94.6 per cent of the men's clothing; 93.1 per cent of the paint and varnish, 92.6 per cent of the confectionery, and did 84 per cent of the meat-packing.

When large railroad repair shops are located in cities of moderate size, as at Decatur, Aurora, Danville, Bloomington, Galesburg, and Mattoon, they become at once the leading manufacturing industry of the city.

Fuel and power.—The factories of Illinois used as fuel in 1914, 14,500,000 tons of bituminous coal, 219,000 tons of anthracite coal, 2,600,000 tons of coke, 4,000,000 barrels of oil and gasoline, and 1,800,000 cubic feet

sixth in manufactures and fifteenth in population; Pekin ranks ninth in manufactures and thirty-sixth in population.

While Chicago, because of its large population and its great commercial interests, is predominant in most industries of the state it holds especially high rank in certain localized industries. Thus, in 1914, Chicago manu-



ALUMINUM ORE COMPANY, EAST ST. LOUIS

The location of East St. Louis is favorable for the making of aluminum. The raw materials used are bauxite, limestone, coal, and soda ash. The bauxite comes from Arkansas. (Copyright by Keystone View Company.)

of gas. Anthracite coal was used more largely in the smelting and refining of zinc than in any other industry. More bituminous coal was used in the manufacture of coke than in any other single industry. The coke was used especially in blast furnaces in the making of iron.

Illinois developed 1,300,000 primary horse-power for operating the manufacturing establishments in 1914. Chicago used for manufacturing purposes 94,000 tons of anthracite coal, 5,200,000 tons of bituminous coal, nearly 2,000,000 tons of coke, and developed 681,000 primary horse-power. Joliet used 950,000 tons of bituminous coal and 580,000 tons of coke. Peoria used 422,000 tons of bituminous coal and East St. Louis 385,000 tons.



DRILLING HOLES IN WATCH PLATES, ELGIN
WATCH COMPANY, ELGIN

A modern watch factory illustrates, on a large scale, division of labor and the extensive use of machinery. (Copyright by Keystone View Company.)



STOVE-MANUFACTURING PLANT, QUINCY

Excellent railway lines, leading to distant regions, bring the factories of Illinois into direct connection with all parts of the country.

Summary.—The geographic location of Illinois is exceptionally favorable for obtaining the raw materials of manufacture and for distributing the finished product. The abundant coal reserves assure a great future industrial development. The ex-

CHAPTER XV

TRANSPORTATION

Development of transportation.—Transportation in Illinois has undergone all the changes of the world's methods of carrying goods and travelers from place to place. The Indian canoe of the explorer, the flatboat of the early settler, the river steamboat from its earliest development, the sailing vessel of explorers on the Great Lakes, the lake steamboat of early immigration days, the canal boat which preceded the railroad, the Great Lakes freighter and swift passenger boat of today, the pleasure yacht, and the gasoline launch have all aided in the water-transportation problems of Illinois.

On land the progressive development of the means of transport has paralleled and eclipsed that on river, lake, and canal. In early days of Illinois' exploration and settlement no small amount of traffic required the services of the human porter. The pack horse was then brought into use. Wagon roads were soon laid out across open prairies and through the forest. These converged on the streams at convenient fording places, and ferries were established at many points along the large rivers.

The building of public highways at federal and state expense seemed for a time to be the only way of improving land transport and of reducing somewhat the excessive cost of carrying passengers and freight to all parts of the state and nation. Suddenly and unexpectedly the railroad, in only a few years, revolutionized transportation problems, not only for Illinois, but for the world. Today, at a mere fraction of previous cost, and at an incredible saving of time, passengers and commodities are transferred safely from any point in the United States to any point in Illinois by railroad, a method of transportation wholly unknown to the world in the early years of Illinois statehood. No point within the state of Illinois is more than 15 miles in a direct line from a railroad, and only a small fraction of the area of the state lies more than 5 miles from a railroad line.

The remarkable development and universal use of the automobile in recent years has again made the improvement of the public highways a matter of first importance, and a system of state highways in Illinois, consisting of 4,800 miles of hard-surfaced roads reaching every county and all towns of importance, is now in process of construction.

The most recently developed method of transportation in Illinois and the world is that of the airplane, and the rapid and progressive development of air transport seems quite certain for the future.

Early transportation.—Long-distance transportation in Illinois, as elsewhere in the world, developed first on water, then on land. Early transportation in Illinois, therefore, consisted of the carrying of travelers and goods as far as possible by river, or lake, or canal, limiting the land transport to the necessary haul by wagon between the local community and river port, lake port, or canal port. Illinois, although located far in the interior of the continent, is exceptionally well situated for water transportation along the borders and centrally across the state. Its 60 miles of lake front has three good harbors, one at Waukegan and two at Chicago on the Chicago and Calumet rivers. This gave Illinois uninterrupted connection with all places on the Great Lakes from Buffalo at the foot of Lake Erie to Duluth and Superior at the head of Lake Superior. The Wabash River with its 200 miles of navigable length along the Illinois border, the Ohio with 125 miles, and the Mississippi with 615 miles gave easy approach to the state from all directions. The navigable Illinois with a good depth of water and slight current opened a highway of travel across the state 278 miles in length from its junction with the Mississippi to its source formed by the union of the Kankakee and Des Plaines. Supplemented by the Illinois and Michigan Canal, 100 miles in length, a water highway of commanding importance was opened across the entire state, bringing the interior regions of the state into easy communication with the East through the Great Lakes and with the South through the Mississippi River.

The earliest explorers and the first settlers entered Illinois along river routes. Joliet and Marquette in 1673 traversed the full length of the state along the Mississippi, and on their

return journey later in the same year they crossed the full width of the state, through the Illinois Valley and the Chicago Outlet to Lake Michigan. La Salle in 1679 first visited Illinois, entering the state by way of the Kankakee route, and continuing his journey along the Illinois. The first settlements in Illinois, about the year 1700, at Cahokia and Kaskaskia, were made by pioneers who came in boats down the Mississippi. George Rogers Clark and his company of soldiers in 1778 were the first to carry the stars and stripes on Illinois soil, and their entrance was made near Metropolis in Massac County after a journey of hundreds of miles on the Ohio River.

The canoe was the means of transport of the early explorers in Illinois, and it still holds its place among water craft for pleasure seekers and fishermen. The flatboat of the pioneer quickly gave way to a safer and more rapid method of travel with the appearance of the steamboat. La Salle's "Griffin," the first lake boat built for carrying on commerce with the Illinois country, failed to reach an Illinois port, and more than another century elapsed before the sailboat found its way to the Chicago River. Soon thereafter the lake steamer put in its appearance, and lake transportation has since been an ever-increasing factor in the commercial welfare of Illinois.

River transportation.—The first steamboat on the Ohio River was operated in 1811, and steamboat traffic on the Ohio and Mississippi rivers became at once an important influence on the settlement and development of Illinois. Shawneetown on the Ohio, just below the junction with the Wabash, and on the northern edge of the Illinois Ozarks, became an important port of entry for pioneers whose destination lay north of the Ozark Ridge. During the years of Illinois Territory and the early years of statehood, Shawneetown, because of its importance as a river port, was the leading city in eastern Illinois. St. Louis was the chief river port from which the steamboat lines proceeded to Illinois towns along the Mississippi and Illinois rivers. In the year 1850 the steamboat arrivals at St. Louis numbered 2,899. Of this number 788 came from the Illinois River, 634 of which were from Peoria.

The northernmost river port of the state is Galena, at which the first steamboat arrived in 1822. Regular traffic was estab-

lished in 1827. The number of steamboat arrivals at Galena was 153 in 1835 and 350 in 1837. The arrivals remained near this number each year until 1855, at which date the railroad reached Galena and the river traffic suffered a sharp and permanent decline. From the appearance of the first steamboat until the arrival of the railroad, the river traffic was supreme for all towns along the Mississippi and Ohio rivers.

The first steamboat appeared on the Illinois River in 1828. Beardstown was founded in 1829, and by 1831 steamboats were



RIVER STEAMBOAT AT ROCK ISLAND

Steamboat traffic in Illinois began in 1811, had its most rapid development 1835-55, followed by a rapid decline due to railroad development, 1850-70. A few large river steamboats, like the one in this scene, still do a thriving business, and efforts are being made to increase water transportation on Illinois waterways.

arriving from St. Louis almost daily. Peoria, which had been settled by the French as early as 1725, received its first steamboat in 1829. Three steamboats were making regular trips to Peoria in 1833; seven in 1834; 44 in 1840; 60 in 1841; 150 in 1844. After this date the number of arrivals, rather than the number of different boats, was reported. There were 694 arrivals of steamboats at Peoria in 1845;

1,286 in 1850; about 1,800 in 1852. In addition to these there were large numbers of canal boats, barges, and flatboats.

When Peoria was first reached by steamboat, not a town had been settled farther up the Illinois River. With the new means of transport available, settlements were started during the next few years at nearly all the towns of present importance between Peoria and the head of easy river navigation at La Salle. Settlements were also established at a few sites which were later abandoned.



RIVER STEAMER LEAVING DOCK AT LA SALLE

another twenty years this new, cheap, rapid, and safe means of transportation was all but discarded by the still more rapid rise of another and more effective competitor—the railroad.

Today all large river ports in Illinois have railway connections. The largest ports without railroads are Nauvoo in Hancock County on the Mississippi River, Elizabethtown and Rosiclare in Hardin County on the Ohio, and Hardin, Calhoun County, on the Illinois. The population of Nauvoo in 1910 was 1,020, and of each of the others between 600 and 700.

The twenty years, 1835–55, is the period of steamboat supremacy on the Illinois River. The decline in river traffic was as rapid as its rise. In 1870 only four steamboats were making regular trips between St. Louis and Peoria, and only one of these went up the river to La Salle. In the short space of 20 years the river and canal boats, as a new method of transportation for Illinois, had risen more rapidly and had become more effective than an earlier generation had supposed possible. In less than

Canals.—The Illinois and Michigan Canal, 100 miles in length, constructed from Peru and La Salle along the Illinois and Des Plaines valleys and across the low divide to the South Branch of the Chicago River, was opened in 1858. The towns along its course were laid out during the construction



BRIDGE OVER OHIO RIVER AT METROPOLIS, MASSAC COUNTY

This view shows the bridge under construction. In the river is a car ferry carrying several railroad cars across the Ohio. This is slow work as compared with crossing on a railroad bridge. (Copyright by Keystone View Company.)

period, 1836 to 1848, and had their early growth because of the excellent transportation facilities of that day furnished by the canal. The canal was a powerful factor in the settlement and development of a wide region along its own length and far down the Illinois Valley.

The traffic on the Illinois and Michigan Canal did not decline as promptly as that on the rivers. The canal tolls increased until the middle sixties and the tonnage until the early eighties. A fair tonnage was maintained until 1899, when traffic almost disappeared in a single year.



LOCK AND DAM, HENRY, MARSHALL COUNTY

The dam and lock at Henry are for the improvement of navigation in the main channel of the Illinois River.

state amounted to approximately \$6,000,000, and the earnings during its productive period were about \$3,000,000.

The Illinois and Michigan Canal is associated with the period of rapid settlement in the state. Two other canals were built after the state was fully occupied. These are the Illinois and Mississippi Canal, usually known as the Hennepin Canal, and the Chicago Sanitary and Ship Canal, more commonly referred to as the Chicago Drainage Canal.

The Hennepin Canal follows the line of the preglacial valley from the Great Bend in the Illinois River at Hennepin, 15 miles below the junction of the Illinois and Michigan Canal with the Illinois River, to the Mississippi River at

The Illinois and Michigan Canal was a state enterprise. It cost about \$6,500,000. The receipts for lands donated by the federal government to the



CHICAGO RIVER, SHOWING BARGES TOWED BY TUGBOAT

Chicago River, originally a shallow stream, has been deepened and widened so that large lake boats now pass readily to wharves and warehouses that line the sides of Chicago River, the South Branch and the North Branch.

Rock Island. It follows the valleys of Bureau Creek and Green River. It was built by the national government. Construction work began in 1892, and the canal was opened in 1907. The cost was \$7,000,000. The canal is supported by the federal government, and no tolls are charged.

The Chicago Drainage Canal is 28 miles in length. Its construction began in 1892, and the canal was opened in 1900. It joins the South Branch of the Chicago River 6 miles from Lake Michigan, and parallels the route of the Illinois and



LOCKS ON ILLINOIS AND MICHIGAN CANAL, MARSEILLES, LA SALLE COUNTY

This scene shows the lower level of the canal in the foreground, the lock in the middle with both sets of gates closed, and the upper level of the canal stretching away in the distance. (Copyright by Keystone View Company.)

Michigan Canal across the low divide into the Des Plaines Valley. At Lockport the Drainage Canal empties into the Des Plaines River at the great hydro-electric power plant erected to utilize for power the water from the canal. The canal is built wide enough and deep enough to carry large lake boats, but no traffic requiring large boats has been developed along the canal. The power plant supplies electricity for use in Chicago and the cities along the route of the canal.

A lock more than 40 feet in height has been constructed at Lockport. Canal boats now traverse the Chicago Drainage

Canal between Chicago and Lockport and pass through this lock to and from the old channel of the Illinois and Michigan Canal.

The present traffic on the three canals of Illinois is almost negligible in quantity.

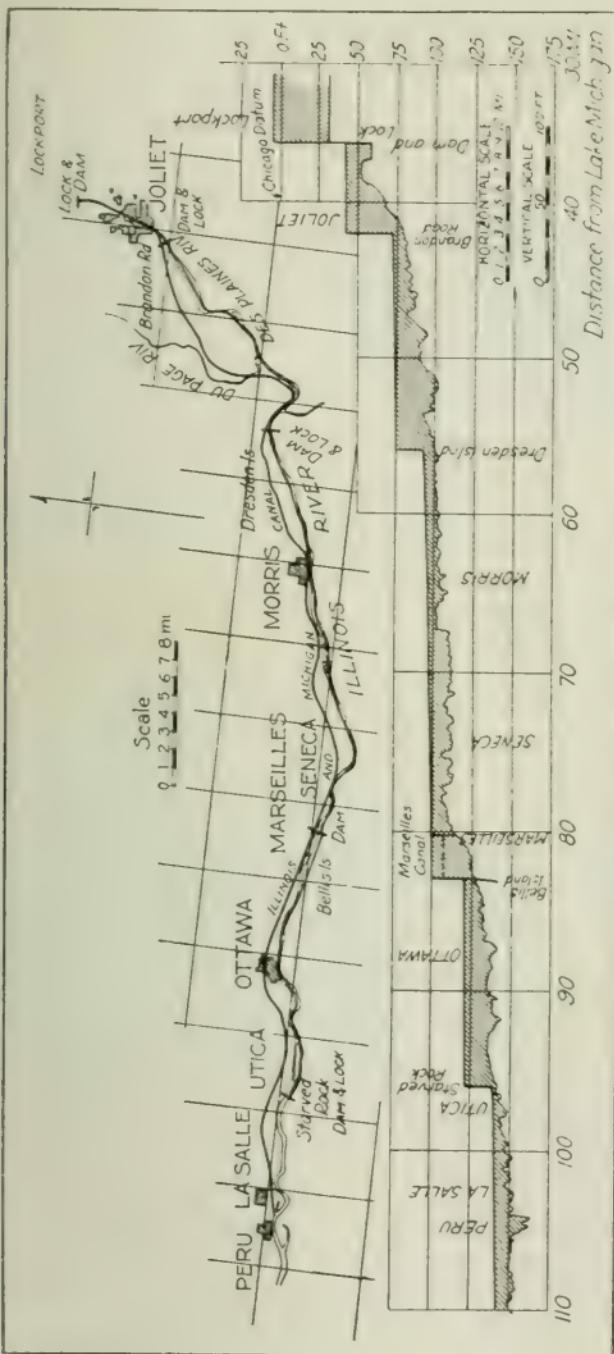
The Chicago Drainage Canal was constructed primarily as a sanitary canal with the expectation that it would become a part of the "Lakes to Gulf Deep Waterway." As a sanitary measure it has fulfilled expectations. Lake Michigan is the great reservoir for the water supply of Chicago and other cities



CHICAGO DRAINAGE CANAL, LOOKING UPSTREAM FROM WILLOW SPRINGS, COOK COUNTY

In the distance the canal is excavated in the earth; in the foreground it is passing from the earth channel to the rock cut.

on the lake front. With the opening of the Drainage Canal, a current of water was set in motion from the lake along the Chicago River and the canal, across the low divide and into the Illinois River system. This flow of water carries all the sewage of Chicago away from the lake, leaving the water supply pure. The Chicago Sanitary District has paid for this improvement with taxes amounting to many millions of dollars. The canal, at the time of its opening in 1900, had cost \$33,000,000. Extensions since that date and expense of operation have added many millions more to the cost of providing Chicago and vicinity with an inexhaustible supply of pure water.



MAP AND DIAMONDS SHOWING ILLINOIS WATERWAY LOCKPORT TO LA SALLE

Plans have been prepared by the state, and federal permission has been granted, to develop power and better navigation along the route here shown.

The Illinois Waterway.—Recent transportation problems have led to renewed interest in the inland waterways of Illinois. Plans adopted by the state and approved by the federal government are now in progress of development. The project is known as the "Illinois Waterway." The construction involves the improvement of the Des Plaines River from Lockport in Will County to its confluence with the Illinois River at Dresden Heights in Grundy County, and the Illinois River from that point to La Salle in La Salle County. The Illinois River now affords water navigation from La Salle to the Mississippi.

There will be 5 locks and dams: one at Lockport, one at Brandon's Road just south of the city limits at Joliet, one in the vicinity of Starved Rock Park just south of Utica. The locks will be 110 feet wide, 600 feet long, and will permit the handling, at a single lockage, of fleets with a cargo capacity of 7,500 tons. The annual tonnage capacity of the waterway will approximate 60,000,000 tons.

The waterway will have a bottom width of not less than 150 feet and a surface width of not less than 200 feet, with much greater widths at most places. The minimum depth of the channel will be 8 feet in earth, 10 feet through rock, and 14 feet in locks.

The power plant of the Sanitary District at Lockport now develops 25,000 horse-power. The Illinois Waterway will have a power development of about 35,000 horse-power. This means a saving of about 750,000 tons of coal annually. The map on page 237 shows the location of the Illinois Waterway, its dams and locks.

Lake commerce.—Lake traffic to and from Illinois began with the sailing vessels which occasionally arrived at Chicago. Navigation on Lake Michigan developed somewhat later than on the Ohio and Mississippi rivers. Only three sailing vessels came to Chicago in 1831. The first steamboat arrived in 1832. By 1836 the number of arrivals had risen to 436.

Steam railroads.—The motive power used on the first railroads of Illinois was animal power. The steam locomotive was soon put into use, and it is now the chief means of power.

The beginning of the Illinois railroad systems occurred in 1837. By 1850 railroads were in operation between Springfield and the Illinois River and between Chicago and Fox River. The rapid development of railroads during the decade 1850 to 1860 enabled settlers to reach the unoccupied areas of Illinois, especially the prairies situated at considerable distances from waterways.

The great prairies still remained largely unoccupied in 1850 as a comparison of the woodland and prairie map with the population map of 1850 clearly shows. The problem of transportation and of markets still prevented their occupation. During the decade 1850 to 1860, however, their conquest was rapidly accomplished, and in the latter year the Grand Prairie had everywhere a population of over six to the square mile, and the great prairies to the north of the Illinois River more than eighteen per square mile. The population of the state as a whole increased over 100 per cent in the ten years. This extraordinary change was made possible by the rapid building of railroads. In 1850 Illinois had only 110 miles of railroad; in 1860 it had 2,867 miles. During



LAKE FRONT, SHOWING TRACKS OF ILLINOIS CENTRAL RAILROAD, CHICAGO



NETWORK OF MAIN LINE TRACKS AND RELAY DEPOT, EAST ST. LOUIS

East St. Louis ranks next to Chicago as a railroad center in Illinois. Four bridges span the Mississippi at or near East St. Louis. (Copyright by Keystone View Company.)

made it possible to build railroads rapidly and easily; in the northern and eastern parts especially, the railroads were not held to certain

predetermined courses by relief, but could be built with equal ease in almost any direction across the flattish surface of the upland prairies.

The railroads supplied lumber to the home builder on the great prairies. They brought the farms much closer to a market, increased greatly the value of land in the vicinity, and permitted a rapid growth in agricultural products.

Except along the edges, little of the great prairie tracts in the middle valley counties was occupied in 1850. In the decade 1850 to 1860, the aggregate population of the six counties (Bureau, Putnam, Marshall, Woodford, Peoria, Tazewell) increased 124 per cent. The area of the improved

land increased 213 per cent, and the grain production 165 per cent in the same time. The relative increase in population in the prairie townships back from the river was much greater, but cannot be stated exactly outside of Bureau County. There the townships of Walnut and Ohio, largely unoccupied in 1850, gained respectively 1,025 per cent and 489 per cent. The adjacent inland counties whose growth before 1850 had been



TYPICAL RAILROAD DEPOT OF A SMALL CITY,
CARROLLTON, GREENE COUNTY

retarded by their distance from the river filled rapidly. The four on the north and northwest increased 190 per cent during the decade, while the three to the southeast gained 224 per cent.

At the same time that the railroads were opening up the great prairies, improved farming machinery was facilitating their agricultural development. Drills, mowing machines, reapers, threshing machines, and the like were coming into general use.¹

The railroad mileage in Illinois by decades is shown in the following table:

TABLE I

RAILROAD MILEAGE IN ILLINOIS

Year	Miles
1840.....	26
1850.....	110
1860.....	2,867
1870.....	4,823
1880.....	7,851
1890.....	10,213
1900.....	11,002
1910.....	11,878
1915.....	12,406

These mileage figures include only the actual length of the right of way and do not take account of double-track mileage,

¹ H. H. Barrows, *Geography of the Middle Illinois Valley*.

industrial tracks, yard tracks, and sidings. The trackage of Illinois railroads for 1915 was as follows: main line and branches, 12,406 miles; second main tracks, 2,818; third main tracks, 221; fourth main tracks, 124; all other main tracks, 75; yard tracks and sidings, 8,254; total—all tracks, 23,898 miles.

The railroads of Illinois own right of way sufficient to reach across the United States from ocean to ocean five times and a total trackage sufficient to cross the continent nine times. Illinois has approximately 5 per cent of the 253,788 miles of the railroad mileage of the United States and 6 per cent of the 394,944 miles of trackage. Texas with 15,831 miles of railroad is the only state surpassing Illinois in mileage. So thoroughly is Illinois supplied with railroads that Hardin and Calhoun are the only counties of Illinois without railroads, and Nauvoo, a river port in Hancock County, is the largest town in the state without a railroad. The largest inland town without a railroad is Perry, Pike County, with a population of 649 in 1910.

Electric railroads.—During recent years electric railroads have had an important development in Illinois for interurban traffic. The street railways of the cities of the state are operated entirely by electricity. Electric railroads have usually been built between important centers of population already connected by steam railroads, and the frequent service and central location of passenger terminals have made the electric roads a favorite means of travel for short journeys. In a



THE TOWN ELEVATOR

The grain elevators of Illinois situated at intervals of only a few miles along 13,000 miles of railway, bear eloquent testimony to the fertility and productiveness of Illinois soils.

number of instances lines have been established between cities without other direct railroad connection with each other, and short branch lines have been built to towns having no other railroad facilities. The electric railroads of Illinois, including elevated railroads, but not street-car lines, had, in 1914, a trackage of 1,912 miles.



TYPICAL COUNTRY ROAD NEAR GENESEO,
HENRY COUNTY

The earth roads of Illinois, when properly graded, are excellent highways in favorable weather, but a comprehensive system of hard-surfaced roads is being developed throughout the state so that traffic on the principal highways may move readily in all kinds of weather.

nary public highway. The food, clothing, building materials, machinery, and other necessities of all the people in city and country alike reach the consumer in the last stages of transportation along public streets and public roads.

The system of public highways in Illinois has been fully laid out and opened to public travel. The entire system measures 96,000 miles, eight times the mileage and four times

The horse car, the cable car, and the steam engine have all disappeared in city street-car systems of the state, and electricity has been substituted. The cities of Illinois had a street-railway mileage of 822 miles in 1914 and a trackage of 1,480 miles.

Public highways—
The splendid railway systems of Illinois can serve the people of the state only by having direct connection between railroad stations and farms by means of public highways. Every bushel of grain, every ton of hay, every head of live stock sold in Illinois starts to market along an ordinary public highway.

the trackage of the railroads of the state. This system is of sufficient length to make forty highways from ocean to ocean across the United States. It would reach one-third of the distance to the moon. The system needs, not extension, but improvement.

A law was passed in 1917 providing for a state-wide system of hard-surfaced roads. Routes were laid out so that this system of state highways will reach into every county and to every town of 2,000 inhabitants or more. The plan includes the construction of 4,800 miles of roads at an estimated cost of \$60,000,000. The law provides for an increase in the amount of motor-vehicle fees. The rates for 1918 were made 50 per cent higher than in 1917, and for 1919 and thereafter double those of 1917. The revenues to be derived from the increased fees together with the normal increase in the number of motor vehicles have been carefully estimated. It is believed that the income from this source alone will be sufficient to pay the interest on \$60,000,000 worth of bonds, to retire the bonds within twenty years, and to furnish a fund sufficient to keep the roads always in excellent repair.

The question of issuing bonds for this enterprise was submitted to the voters of the state at the election of November 5, 1918. It was approved by a large majority, and construction began in 1919.

The following table shows the rapid growth in the use of motor vehicles, most of which are automobiles:

TABLE II

Year	Number of Licenses	Fees Collected
1911.....	38,269	\$ 105,344.28
1912.....	68,012	275,716.22
1913.....	94,646	507,134.77
1914.....	131,140	703,403.70
1915.....	180,832	924,905.74
1916.....	248,429	1,236,566.35
1917.....	340,292	1,588,834.69
1918.....	389,761	2,764,330.28
1919.....	478,438	3,262,176.57
Total for 9 years	1,969,819	\$11,468,412.60

The 4,800 miles of highway proposed under the law of 1917 embraces 5 per cent of the total mileage of the state, and 85 per cent of the people of the state live within five miles of these roads. It is estimated that with a system of good roads the number of motor vehicles will soon increase to 600,000 and the annual income from fees to \$6,000,000 annually. This will be ample to pay the interest and principal of the bonds and to keep the roads always in good repair.

Early stages of state road-building.—The construction of the state highway system of hard roads is under the direction of the Department of Public Works and Buildings, Division of Highways. The roads are of two classes based on the source of funds for construction. The *Federal Aid Roads*, including about 800 miles, will be paid for jointly by the state and federal governments, and the *State Aid Roads*, 4,000 miles in total length, by the state and counties in which the roads are located. These two systems are shown on the accompanying map. The systems of Federal Aid Roads have been officially named as follows: *Lincoln Highway* from Chicago to Clinton, Iowa; *Chicago-Waukegan Road* from Chicago to Wisconsin state line; *Chicago-East St. Louis Road* from Chicago to East St. Louis via Joliet, Ottawa, La Salle, Peoria, Springfield, and Carlinville; *Dixie Highway* from Chicago to Danville; *National Old Trails Road* from St. Louis to Terre Haute, Indiana.

During 1919, 575 miles of the Federal Aid Roads were put under contract and 170 miles completed; 105 miles of State Aid Roads were contracted for and 70 miles completed. These contracts were to be completed as early as possible in 1920. The contracts of 1920 exceed those of 1919, and year by year the system will be rapidly extended to completion. The financial and construction plans for this extensive system of good roads provide for repair and upkeep, so that excellent roads for Illinois seem assured for the future.

Air transportation.—Heavier-than-air machines were successfully driven through the air over a measured course before military authorities by the Wright Brothers in 1908. Steady development of the airplane took place until 1914, when, with the outbreak of the great world-war, it became a deciding factor in military supremacy on the battlefield. On the



MAP SHOWING FEDERAL- AND STATE-AID ROAD SYSTEM OF ILLINOIS

entrance of the United States into the world-war in 1917 two aviation camps were established in Illinois: Chanute Field at Rantoul, Champaign County, and Scott Field at Belleville, St. Clair County. Here hundreds of young men received training for service with the American Expeditionary Forces on the battle fields of Europe. In their practice flights these aviators flew over all parts of the state, and within a radius of fifty miles of the aviation camps airplanes were a common sight to thousands of spectators. During the world-war every effort was put forth to develop the airplane as a



VIEW OF SPLIT ROCK, NEAR LA SALLE, SHOWING THREE METHODS OF TRANSPORTATION

The Illinois and Michigan Canal, seen at the right, was first to be constructed; then followed the double-tracked railroad one track through a short tunnel; and finally the electric interurban railroad crossed the scene on a bridge. Split Rock is on the crest of the La Salle anticline. (Copyright by Keystone View Company.)

military machine, and the progress in air navigation has been marvelous indeed. With the coming of peace this new method of transportation will find a large place in the daily work of Illinois and the world.

A century of transportation.—In the year 1818, when Illinois attained statehood, the canoe and the flatboat were in general use; the river steamboat traffic was only seven years old on western rivers, and the people of the state eagerly forecast the wonderful possibilities of the changed conditions of travel. In the year 1918, as Illinois was celebrating her first Centennial, the inhabitants of the state looked back and considered

the story of the rapid rise and more rapid decline of the river steamboat traffic as one of the great chapters in the development of Illinois. We now contemplate the innumerable advantages of steam and electric railroads over river and canal, and contrast the automobile with the "prairie schooner" of pioneer days. We now look forward as eagerly as did our forefathers of a century ago to the possibilities of improved public highways constructed at state expense. The people of 1818 contemplated the future possibilities of steamboat navigation on the rivers of the state. We of a century later are contemplating the future possibilities of air navigation as an everyday method of transportation.

CHAPTER XVI

LOCATION AND GROWTH OF CITIES

Determining factors.—Illinois possesses places which had military importance during the periods of exploration, national determination, and early settlement. Starved Rock, rising abruptly from the Illinois River and the surrounding small valleys, was the site of Fort St. Louis, about which La Salle and his followers gathered a large Indian population. Fort Massac at Metropolis commanded the approach of the Ohio River from both directions. Fort Chartres in the northwest corner of Randolph County, on the flood plain of the Mississippi, was once the site of great social and military activity, but due to changes in the river channel the remnants of the old fort are now more than a mile from the river, and the un instructed traveler along river or highway passes the locality unaware of the importance the site had in the early history of the Illinois country. Fort Dearborn on the Chicago River guarded the Lake Michigan entrance to the Illinois country. The sites of three of these military posts are now preserved as state parks. They are in the open country. The site of Fort Dearborn has become the center of a great commercial metropolis, so crowded with mercantile establishments that the historic site of the old fort is marked only by a marble tablet attached to one of the buildings. Military advantage alone does not insure the location and growth of a great city.

Political forces have operated in the location and growth of Illinois cities to some extent. Congress, at the request of the state legislature, granted public land on the Kaskaskia River as a site for a new state capital. Vandalia in Fayette County was established in 1819 as a result of this legislative action. Twenty years later, by vote of the state legislature, the capital was removed to Springfield. While Springfield was not established by this action, its future importance and growth were greatly enhanced thereby.

The bitter contests waged in a number of Illinois counties, sometimes extending over a long period of years, for the possession of the county seat illustrates the fact that political forces operate to mold the development and growth of cities. Professor Buck illustrates this point as follows in *Illinois in 1818*:

Each of the fifteen counties, with the exception of Franklin, had a county seat; but these towns as a rule contained little more than a court-house, jail, and tavern, and possibly a general store. That they depended for their existence on the county business is evident from the number of them which failed to survive the loss of their position as county seat: Palmyra, Brownsville, Covington, Perryville, and even Kaskaskia, are now to be found only in the records of the past.

It does not follow that a place selected as a political center has an assured future.

Religious zeal has been the occasion of the location and growth of at least two Illinois cities of importance. Nauvoo, Hancock County, on the Mississippi River, was a small village of but a few houses prior to 1840. It was then selected by the Mormons as a location for a settlement. Within four years Nauvoo had a population of 16,000. In 1846 the Mormons left Nauvoo and migrated to Utah, where they founded Salt Lake City. The population of Nauvoo in 1910 was 1,020. Zion City, Lake County, on the shore of Lake Michigan, was founded by John Alexander Dowie and his followers in 1902. Its population in 1910 was 4,789.

While military, political, and religious forces have played a part in the location and growth of a few Illinois cities, the great compelling factors in the establishment and development of centers of population in Illinois, as elsewhere in the world, are geographic and economic. These economic forces are complex in their nature and operation. They involve opportunities for collecting the products of the locality and forwarding them to market; for securing and distributing supplies to the community; for obtaining raw materials and fuel or power for manufacture; for marketing the manufactured product. A simple and comprehensive statement of the operation of these economic forces is the following: *Population and wealth tend to collect wherever there is a break in transportation.*¹

¹ Charles H. Cooley, *The Theory of Transportation*.

Breaks in transportation—Cahokia and Kaskaskia, the first permanent settlements in Illinois, were made where there were breaks in transportation between river and land. Both were located so that the pioneers could travel readily either by land or by water. Changes in the river channel wrought important changes for both settlements. Cahokia is now well back on the flood plain because of the deposition of sediment. Its population in 1910 was 150. The site of Kaskaskia has been washed away by the current of the Mississippi. East St. Louis, only four miles north of Cahokia, is located at the best river crossing from Illinois to St. Louis and it has become a flourishing city. Peoria, located at the best place on the Illinois River, first for a ford, then for wagon and railroad bridges, led to the convergence of wagon roads and railroads from both sides of the river. Peru and La Salle have grown up at the break between river and canal transportation of pioneer days. Chicago is found at the break between canal and lake transportation; between lake and railroad; and between railroad and railroad, for not a railroad passes *through* Chicago; it is the *terminus* of every railroad that enters. It is thus a railroad *focus*, rather than simply a railroad *center*.

The railroads of Illinois were built to connect centers of population already existing, or to connect a center of population with a break in transportation. Thus the first railroad constructed from Springfield to the Illinois River aided the inhabitants of the inland region to reach the river, where steamboat accommodations were readily secured. The railroad built between Chicago and Galena connected the two most important cities of northern Illinois at that time. As soon as a railroad is in operation, it makes numerous breaks in transportation between railroad and wagon road, and the number of possible town sites, each located at a break in transportation, is limited only by the speculations of the human mind. On many hundreds of such locations throughout Illinois, villages, towns, and cities have been established. The numerous railroad stations of the state at which the grain elevator is the principal place of business speak emphatically of agricultural prosperity. Every grain elevator of the state marks a break in transportation, and their tall, gaunt structures at intervals of only a few

miles along every railroad give pleasure to the mind of the traveler who interprets them in terms of the productiveness and prosperity for which they stand. No village is founded at a distance from a railroad, if a railroad location is accessible. Many thriving villages of Illinois, established before railroad development, have continued as community centers, although not reached by a railroad, but they have not grown in population and importance.

Shifting the break in transportation.—Before the advent of the railroad all thriving commercial centers in Illinois were river, canal, or lake ports, or within easy wagon haul of a port. The railroad system of the state brought about profound changes in both actual and relative importance of previously established town sites. In the days of steamboat traffic Oquawka, Henderson County, was a busy shipping point on the Mississippi. It was carefully considered as a suitable point at which to cross the Mississippi. The decision, however, fell to Burlington, Iowa. In 1910 Oquawka had a population of 907; Burlington 24,324. Shawneetown, during the days of river steamboat traffic, was the most important city in southern Illinois. Its importance decreased with the decline of river traffic.

The effect on Illinois towns of shifting the transportation break from river ports to railroad centers appeared in a striking manner among the river ports of the middle Illinois River.

The Illinois river towns that obtained good railroad connections did not suffer greatly from the decline of river trade. This was especially true of Peoria, which became a great railroad center for the same reasons that it had before been an important road center, and which also developed extensive manufacturing interests. It was true to less extent of Pekin. To every other river town within the area considered in the report [Depue to Pekin] the passing of the steamboat was a serious blow, and several suffered an actual decrease in population.

Depue had been the great shipping point for an extensive area west of the river, and enjoyed a large trade until near the close of the fifties. By that time the back country had important railroad lines, and the farmers ceased to haul grain to the river with its decreasing shipping facilities. The trade of Depue, except from the immediate vicinity, soon ceased.

Hennepin experienced a decline similar to that of Depue. It had a population of 711 in 1857, and a large commerce, but having lost its river trade and being without any railroad, each census since 1860 has recorded a decrease in population, that of 1900 being only 523 [1910, 451].

The population statistics of Henry tell of a period of rapid growth under the influence of river trade, and one of relative stagnation following the

passing of the steamboat. The substantial growth of the place began in 1844 with the multiplication of steamboats above Peoria. It contained 400 people in 1850. During the next six years the population increased over fourfold, reaching 1,664 in 1856. Since the loss of its river trade the town has been essentially at a standstill, having in 1900 only 1,637 inhabitants [1910, 1,687]. The story is again repeated, in principle, in the case of Lacon. In the late fifties this place had nearly 2,000 inhabitants, but it was nearly stationary between 1860 and 1870, and since the latter date it has steadily lost [1910, 1,495]. Lacon's railroad service is far less satisfactory than that of Henry, since it is situated at the end of a branch line.

The decay of Spring Bay is particularly striking. In its best days, it is said to have had eight or nine warehouses to which practically all the farmers of Woodford County hauled their grain. In the spring eight or nine steam-boats might be seen at the levee at a single time loading for the down-river market. The disappearance of the steamboats and the opening of railroads to the east of Spring Bay, running parallel to the river, proved a death blow to the town. Most of the inhabitants moved away, and the last warehouse was destroyed years ago [population 1910, 119]. Chillicothe has had a happier history. Like the other river towns mentioned, it suffered from the loss of its river grain trade, but it was fortunate in later becoming a junction point between two important railroads. Its population accordingly increased rapidly between 1880 and 1890, but it has been nearly stationary since [population 1910, 1,851].¹

The influence on the towns of the middle Illinois Valley of the competition of railroad traffic with river transportation is typical of changes which took place along other stretches of the Illinois River and along the Mississippi and Ohio rivers. The same forces operated also in the competition between new towns established on railroad lines and older towns which had flourished on overland wagon routes, but were not favored by a railroad.

Railroad centers.—Along every railroad, towns have been established at intervals of a few miles, usually less than ten miles. These numerous stations are necessary to reduce the amount of wagon haul of bulky products such as grain, lumber, and coal, for wagon transport is many times as expensive per ton-mile as carriage by railroad. The intersection of two railroads is not necessarily marked by an important town, but the railroad station is usually there and provision made for exchange of passengers and freight between the two railroads. A town of importance may develop to serve the surrounding community. The transportation facilities are better than when only one railroad is present. The intersection of three or more railroads is very likely to give rise to a town of local importance.

¹ H. H. Barrows, *Geography of the Middle Illinois Valley*.

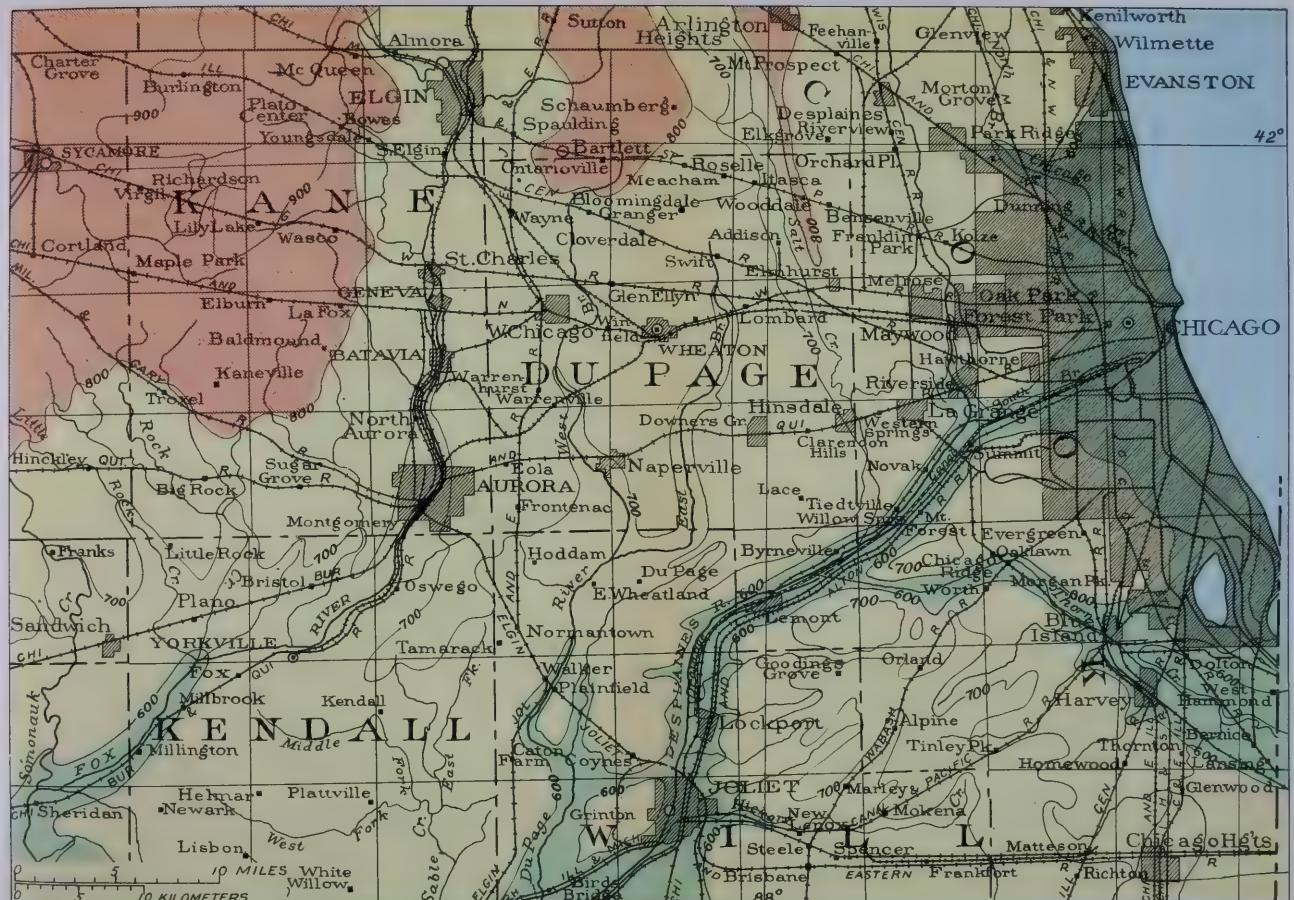
Three roads lead out in six directions from the center if all are through lines. Quincy is the sixth city of the state and the largest with only three railroads. If the attention is centered on the railroad lines of a railroad map, the location of the important cities will be evident by the convergence of the railroads at these cities. As the number of railroads entering a city increase, the opportunities for transfer of passengers and freight increases; additional areas of production are made available for raw materials; markets are brought into more direct contact with the manufacturer; and continued growth and prosperity are assured.

CHAPTER XVII

CHICAGO AND OTHER CITIES OF THE LAKE BASIN

Plan of treatment.—The United States census of 1910 gives for Illinois 144 cities having a population of 2,500 or more. There are several hundred smaller towns and villages with populations between 100 and 2,500. No attempt is here made to deal with individual cities in detail, but an effort is made to give a bird's-eye view of the cities of the state in their geographical setting with reference to each other and to the surface features of the state. To this end the cities are grouped according to the drainage basins described in chapter iv. Within the group the cities are mentioned in an order easily followed on the map. A few leading facts are given concerning many of the cities. All of the 144 cities having a population of 2,500 or more are referred to in the text, and in parentheses the population according to the census of 1910 is given. Many towns and villages with smaller populations are mentioned with census figures inserted.

A region of urban population.—That part of the land surface of Illinois lying in the Lake Michigan Basin has an area of 722 square miles or 1.3 per cent of that of the state. This region comprises portions of Lake, Cook, and Will counties. The total area, however, is 211 square miles less than that of Cook County alone. The region is 80 miles in its north-south extent, and it varies from 4 to 20 miles in width from the lake shore. On this area are found 18 of the 144 cities of the state large enough to be classified as "urban." The combined population (1910) of these 18 cities is 2,334,967, or 67 per cent of the urban population of the state and 41 per cent of the total population of the state. In addition to these 18 cities, the region contains more than a score of other villages and small cities and hundreds of farms. The population of these villages and farms probably does not exceed 25,000, or about 1 per cent of the population of the basin.



CHICAGO AND VICINITY, SHOWING THE DRAINAGE CANAL AND THE BELT-LINE RAILWAYS

The quadrangle represented on this map contains about 4 per cent of the land area and 45 per cent of the population of Illinois

Chicago alone, with its area of 200 square miles, occupies more than one-fourth of the entire Lake Basin in Illinois. The population of Chicago (1910) comprises 93 per cent of the total of the 18 cities of this region, 63 per cent of the total urban population of the state, and 39 per cent of the entire population of the state. Chicago has an average of 11,000 persons per square mile. The average density for the region of 722 square miles is 3,200 per square mile; for the area outside of Chicago 335 per square mile, or only one-half as great as the average density of the whole of England. The average density of the state as a whole is 100 per square mile; that part outside of the Lake Basin has a density of 59 per square mile. Thus the Lake Michigan shore of Illinois is pre-eminently the urban district of the state, and if the lake shore is followed eastward beyond the state line its urban character is evidenced by the closely built cities of Lake County, Indiana.

CHICAGO

POPULATION 2,701,705 IN 1920

Location.—Chicago occupies a frontage of 26 miles along the southwest shore of Lake Michigan, lying to the west rather than to the south of the lake. The distance in a direct line from Chicago to New York City is 700 miles; to Jacksonville, Florida, 850 miles; to New Orleans, 800 miles; to San Francisco, 1,800 miles; to Denver, 900 miles; to St. Paul and Minneapolis, 350 miles; to St. Louis, 260 miles. Railroad distances are somewhat greater.

The central part of the city is in $41^{\circ} 53'$ north latitude and $87^{\circ} 38'$ west longitude. The extreme north-south extent of the city is 26 miles; the east-west extent, 15 miles. The area within the city limits is 200 square miles, or one-fifth of Cook County. The Chicago Plain, on which the city is built, was once covered by Lake Chicago, the glacial ancestor of Lake Michigan. The waters of this ancient lake flowed southwestward through the Chicago Outlet into the Des Plaines Valley, thence into the Illinois Valley. The highest point along this outlet is at the village of Summit, only 12 feet above the level of Lake Michigan. This outlet furnishes easy

passage across the broad, rolling Valparaiso moraine from the Lake Michigan Basin to the basin of the Mississippi. Here the early explorers and first settlers found a portage. No other route was possible for the Illinois and Michigan Canal and for the Chicago Drainage Canal. Early railroads and more recent electric lines follow the same level pathway. Wherever these transportation lines terminate to the westward, one terminus is fixed by nature at Chicago on the level plain once the bottom of a glacial lake.



TALL BUILDINGS ON MICHIGAN AVENUE

In the foreground is a portion of the "outer harbor," along the shore is this row of tall buildings along Michigan Avenue, includ-

The exact location of early settlements in Chicago was determined by the Chicago River, then a small stream less than two miles in length formed by the junction of the North Branch and the South Branch of the Chicago River. The city has expanded so that within its limits are now included all of the Chicago River, all of the South Branch, much of the North Branch, and the mouth of the Calumet River, 12 miles south of the Chicago River. The shallow and sluggish streams which furnished safe retreat for the canoes of the explorers and early traders have been deepened and widened into the extensive harbors of a great port where land and water transportation meet to give Chicago its pre-eminence among the cities of the Great Central Plain.

Influence of waterways.—The position and extent of the Great Lakes, more than any other natural factors, contribute to the rapid and substantial growth of Chicago. Without the Great Lakes, Chicago would have no advantage of position over many other cities located on the Central Plain. If the area of the Great Lakes were fertile plains, St. Louis, Indianapolis, and other inland cities would have better locations within the Great Plain than Chicago. Lake Michigan, more than 300 miles in length, with a width of 50 to 80 miles, imposes



FROM THE BREAKWATER, CHICAGO

are the Illinois Central Railroad tracks, then Grant Park, beyond which
ing some of Chicago's largest hotels and business houses

an impassable barrier to land transportation along the shortest routes from the East to the Far West and Northwest, thus forcing all railroad transportation for these regions around the southern tip of the lake to Chicago. The Lake Michigan barrier to land transport is continued northward by the Straits, Lake Huron, and Lake Superior to the northern shore of Lake Superior, a distance of 500 miles from the southern shore of Lake Michigan.

The Great Lakes serve Chicago not only by compelling railroad lines to focus here, but also by placing at the door of the city, free of charge, the most extensive inland deep-waterway system in the world. Thus from earliest times Chicago has had an open road of 800 miles to Duluth at the head of Lake

Superior and 900 miles to Buffalo at the foot of Lake Erie. By the construction of canals without special expense to

Chicago these water routes have been extended across Illinois to the streams of the Mississippi Basin; across New York state to the Hudson River and the Atlantic; across Canada to Lake Ontario, the St. Lawrence, and the ocean. The Great Lakes have made Chicago the greatest railway focus and the greatest inland port of the world. The accompanying table reveals inter-



BASCULE BRIDGE, CHICAGO RIVER

The continuous street traffic across the Chicago River requires that bridges be opened and closed for vessels as quickly as possible. The bascule bridge meets this need.

esting contrasts between the commerce of the two Chicago harbors. For example, all iron ore and all wheat *received* enter Calumet River, but Chicago River *sends* by lake one-half as much wheat as Calumet River. All lumber, railroad ties, and sugar were received at Chicago River. The number of vessels entering and clearing at Calumet River is only 27 per cent of the total number for the two harbors, while the registered tonnage of the vessels entering and clearing at Calumet River is 60 per cent of the total tonnage of the port. The larger boats are used for the bulky freight entering the Calumet River.



ELEVATOR ON SOUTH BRANCH OF CHICAGO RIVER

Huge grain elevators are built at important grain markets. This elevator is so located that grain may be received from railroad cars and shipped away by lake boats. (Photograph by W. D. Jones.)

TABLE I
LAKE COMMERCE OF CHICAGO, 1917
(From Report of Collector of Customs)

COMMODITY	IN	CHICAGO RIVER	CALUMET RIVER	TOTAL
	Receipts in Tons			
Coal, hard.....	Tons	452,885	192,580	645,465
Coal, soft.....	Tons	4,340	796,237	800,577
Iron ore.....	Tons	.....	7,227,770	7,227,770*
Salt.....	Tons	101,675	3,000	104,675
Iron, manufactured.....	Tons	633	200	833
Lumber.....	M feet	87,886	.....	87,886
Railroad ties.....	Pieces	49,635	.....	49,635
Sugar.....	Tons	13,830	.....	13,830
Wheat.....	Bushels	.....	349,390	349,390
Flaxseed.....	Bushels	546,661	.....	546,661
Unclassified.....	Tons	577,702	1,010,061	1,587,763
Shipments in Tons				
Flour.....	Tons	44,483	25	44,508
Wheat.....	Bushels	923,053	1,976,355	2,899,408
Corn.....	Bushels	575,808	1,701,715	2,277,523
Oats.....	Bushels	1,300,036	4,040,781	5,340,817
Mill stuff.....	Tons	16,863	.....	16,863
Oil cake.....	Tons	1,661	.....	1,661
Pork.....	Barrels	200	.....	200
Unclassified.....	Tons	428,419	525	428,944
Oil.....	Barrels†	.....	.....	.....

* This is exclusive of 3,801,585 tons at Gary and 910,876 tons at Indiana Harbor.

† 1,853,750 barrels of oil were shipped from Indiana Harbor, Ind.

TABLE II
NUMBER OF VESSELS WHICH ENTERED AND CLEARED AT THE PORT OF CHICAGO DURING THE YEAR 1917, AND THEIR REGISTERED TONNAGE

Entrances, Chicago River,	3,089 vessels, registered tonnage,	2,999,044
Entrances, Calumet River,	1,153 vessels, registered tonnage,	4,635,525
Total.....	4,242	7,634,569
Clearances, Chicago River,	3,112 vessels, registered tonnage,	3,044,332
Clearances, Calumet River,	1,186 vessels, registered tonnage,	4,729,253
Total.....	4,298	7,773,585

The service of the railway.—The coming of the railroad added to Chicago's importance as a lake port.

The topography of the Great Plain permitted the building of railroads in all directions. Chicago, because of its superior water transportation, became the focus of all railroads of the region. By having one terminus at Chicago and radiating north, west, south, and east the railroads bound the territory into which they penetrated, all the more closely to this center. The lakes brought from the older East the im-



LIGHTHOUSE, CHICAGO

The national government began the improvement of the "outer harbor" in 1833. The river mouth is protected from the silting shore currents by breakwaters. The lighthouse enables ships to enter the harbor safely at night.

plements and the manufactures needed beyond Chicago. As the radiating lines of railroad rapidly grew in number and in length, larger areas were readily furnished with settlers and goods from the East. These pioneers at once produced surplus crops which the railroads promptly landed at Chicago for transshipment by water.

Chicago's industrial and commercial influence thus increased with the extension of the radiating railroad lines. The period of most rapid railroad development was from



GRAIN ELEVATOR ON CHICAGO RIVER, CHICAGO

Grain elevators are located up the river beyond the regions of congested railroad and harbor traffic, thus making transfer from railroad to lake steamer less difficult.

1850, when Illinois had 110 miles of railroad, to 1880, when 7,851 miles, 60 per cent of the present total mileage of the state, had been completed. The establishment of through railroad service to the East increased greatly the rapidity with which passengers and goods could be carried between the East and the West. Although the freight rates favored, and still favor, the water route, the railroad because of its extension to all productive regions and its rapid and frequent service at moderate cost has become the leading transportation factor in the development of Chicago. The ever-present choice, however, between water transport and railroad served to give Chicago the best possible rates; while the necessity for the cheapest possible freight rates on commodities of great bulk per unit of value, such as coal, lumber, and iron ore, led to steady and permanent growth in lake traffic.

Chicago is now the terminus of 22 great railroad systems and of 17 smaller railroads; 40 per cent of the railway mileage of the United States, more than 100,000 miles, terminates at Chicago. The railroad belt lines encircling the city total 1,400 miles, one-third of the belt-line mileage of the United States. The outer belt line extends from Waukegan through Elgin, Aurora, Joliet, and Chicago Heights, to Gary, Indiana.

The magnitude of Chicago's railroad service to the nation is suggested by the following facts of 1919: More than 100 railway yards are established for the receipt, transfer, and dispatch of freight shipments; 315 freight-receiving stations are located at convenient points throughout the city; 2,500 through package cars leave Chicago daily for 1,800 shipping points in 44 states; more than 17,000,000 head of live stock are received at Chicago in a year; 1,339 passenger trains and 192,000 passengers arrive and depart from Chicago railway stations daily, the equivalent of 70,000,000 railroad journeys per year, or 25 trips annually for every inhabitant of Chicago. The position of Chicago as the focus of competitive railroad systems reaching to all parts of the continent and as the chief lake port of the Great Lakes gives the city commercial supremacy because it has the choice of transportation by railroad or by water. This privilege of choice on the part of Chicago shippers gives the best obtainable freight rates by both

land and water and reacts favorably on the growth of the city by attracting additional factories, wholesale houses, business offices, and transportation lines with their army of workers.

Tributary regions.—A city develops only as it can draw from accessible regions raw materials for manufacture and sale and send into surrounding areas manufactured articles and other commodities brought from distant regions. With its extensive water routes, and especially with its network of railroads spreading out like a spider's web over the United States, Canada, and Mexico, Chicago lays tribute on all the regions of the continent, and through the ports of the Atlantic, Pacific, and the Gulf on all the regions of the world. The Great Central Plain is her favored area with its wealth of coal in Illinois, Indiana, and other states; of lead and zinc in Missouri, Kansas, and Oklahoma; of forests in the lake region and in the southern states; and especially with the abundance of cereals and live stock throughout the vast area of the Central Plain, the most extensive agricultural region of the world. These materials, produced from mine and forest, farm and ranch, find their way to Chicago in larger quantities than to any other city. Here they may be transshipped to more distant markets, or they may be manufactured into more valuable products for later shipment.

But the transportation lines centering at Chicago reach westward far beyond the limits of the Great Central Plain and carry mineral products and live stock from the Plateau states; lumber, fruit, and fish from the Pacific Coast states; fish, furs, and minerals from Alaska; silk, tea, and other products from the Orient. A larger number of railroad and steamship lines reach eastward carrying vast stores of the western products for use in regions of the East and in Europe, and bringing back to Chicago anthracite coal and bituminous coking coal from Pennsylvania, and manufactured goods from the East and from other continents. Chicago is thus the complex product of the interplay of economic forces centered most largely in the Great Central Plain, but reaching out to the most distant regions of North America and the world.

A world-mart.—With the world's richest agricultural area at one door, the world's finest and most extensive inland

waterway at the other, and with superior railroad and steamship connections with all the world, Chicago may rightly claim the title frequently given, "The Great Central Market." Here the raw materials of manufacture, whether from farm, ranch, mine, or forest, are readily assembled, and two-thirds of the



A BUSY DAY IN SOUTH WATER STREET PRODUCE MARKET, CHICAGO

South Water Street, the first street south of Chicago River and parallel with it, is one of the greatest wholesale centers in the world for food products. It is about a half-mile in length. Grocers from all parts of Chicago come here daily to replenish their stocks. (Copyright by Keystone View Company.)

manufacturing of Illinois is carried on in this central workshop. The manufactured products, whatever their weight or their size, find transportation facilities ever ready to carry them promptly and cheaply to the most distant markets of our own

and other lands. The value of Chicago's manufactures for 1918, a year of war-time production, was \$4,300,000,000. The value for a normal year is about \$3,000,000,000.



HAYMARKET SQUARE, CHICAGO

Haymarket Square is a West Side market. Provision was made for it by widening West Randolph Street between Jefferson and North Halsted streets.



CHICAGO HARBOR AND WAREHOUSES

The Chicago River and its two branches, widened and deepened, form the "inner harbor" where the actual loading and unloading of ships take place. (Photograph by Eugene J. Hall.)

But Chicago's distribution of products is not limited to those of her own making. Her world-transportation service invites the jobber and the wholesale merchant to seek this

Great Central Market as a center for gathering the world's products in numerous and extensive warehouses for redistribution to thousands of smaller cities and villages throughout our own land and beyond the seas. The food merchant of Chicago thus brings together every variety of food product for which there is a demand—breadstuffs, vegetables, nuts, fruits, spices, sea foods, and delicacies of every kind. The clothing merchant provides the widest possible choice of fabrics and furs, both domestic and foreign. The merchants in various building materials carry immense stocks of lumber and other building supplies ready for immediate delivery wherever needed. The wholesale trade of Chicago in 1918 was \$3,300,000,000.

Thus the favorable location of Chicago and the enterprise of her merchants have extended her commercial activities to all lands of the earth, making the city a market for articles of commerce of every kind from every land.

An educational center.—Chicago has obtained and maintained her position as a great city not only through natural advantages and commercial enterprise, but the people of the city have realized that permanent growth and progress can be secured only by a broad and sound educational system of schools of all grades. Educational advantages of the most varied sort are therefore awaiting the student of the immediate locality or of more distant regions.

The public schools alone, supported wholly by taxation, have buildings, grounds, and equipment valued at \$6,000,000. There are 300 elementary schools, 21 high schools, a normal school, and two corrective schools for boys. The public schools employ 8,000 teachers and enrol 350,000 pupils. The annual expenditures for public-school education passed the \$20,000,000 mark in 1918. Free evening schools invite thousands of workers to continue their education. The public schools co-operate with the Small Parks Commission in providing recreation grounds for the public after school hours.

Higher education is provided by various institutions. The University of Chicago within the city and Northwestern University at Evanston are among the great universities of the nation, and they attract students from distant regions and

from foreign lands. De Paul University, Loyola University, the Art Institute, Armour Institute of Technology, and Lewis Institute are important educational institutions. The educational facilities of the Young Men's Christian Association furnish opportunities to large numbers. The conservatories of music are widely known. The city is a center for schools of law, theology, medicine, pharmacy, and dentistry. Business schools and trade schools enable students to obtain instruction in many specialized fields. The development of educational



SCENE IN DOUGLAS PARK PLAYGROUND, CHICAGO

Douglas Park, on the West Side, is one of Chicago's fourteen large parks. Well-equipped playgrounds make the parks attractive places for children.

opportunities has kept pace with rapidly growing commercial and industrial activities.

Chicago today.—In 1850 the population of Chicago numbered 30,000; in 1910, 2,100,000; and in 1920, 2,700,000. The city limits have expanded from 10 square miles, when the city was incorporated in 1837, to 200 square miles at present.

Within the city there are 14 large parks, 193 small parks and playgrounds, and 70 miles of boulevards. The parks and boulevards include 5,000 acres of land. The animals of Lincoln Park, the extensive flower displays in many parks, the landscape architecture of parks and boulevards, the bathing

beaches and natatoriums, provide attractive places for rest, recreation, and driving. The total attendance at parks and playgrounds in a single year numbers 36,000,000, or 14 times



NORTH SHORE BATHING BEACH, CHICAGO

In the summer the bathing beaches vie with the parks as centers of recreation and sport



LAKE SHORE DRIVE, CHICAGO, LOOKING NORTH

Lake Shore Drive parallels the shore of Lake Michigan from the business district of Chicago to Lincoln Park. North of Lincoln Park, Sheridan Road follows the lake shore.

the population of the city. Local transportation is furnished by more than 1,000 miles of street railways and by four elevated railways. The number of cash and transfer rides daily exceeds the total population of the city. More people arrive and depart daily from the passenger depots of Chicago than the combined population of the two largest Illinois cities outside of Chicago. The buildings for schools, churches, libraries, and museums are among the best of their kind. A half-million workers find employment in factories, stores, transportation, and other pursuits. The downtown shopping district displays



TENNIS COURTS IN DOUGLAS PARK, CHICAGO

Tennis courts and baseball diamonds are provided for the use of those who enjoy outdoor sports.

the wares of the world in artistic fashion. The combined deposits of 130 banks amount to \$1,500,000,000, more than \$500 per person. The bank clearances for a single year amount to \$36,000,000,000, an amount greater than that spent by any one nation in the world-war. A daily water supply of 671,000,000 gallons is pumped through 3,871 miles of water pipes.

The annual receipts of the Chicago post-office have passed the \$30,000,000 mark, a sum 50 per cent greater than the generous expenditure for public schools. The post-office handles in one year 1,700,000,000 pieces of mail, the equivalent of one letter or package for every inhabitant of the globe. Within the span of a single lifetime 200 square miles of open prairie land, much of it made up of marshes and swamps, has been transformed into the fourth city of the world with an economic, educational, and spiritual foundation which insures future progressive development.

A visit to the metropolis.—Whether a visitor is to spend a day or a week or a month in Chicago, it is possible for him to get such first-hand knowledge of the city that it will guide him

in his future reading and study about the city. Even if alone and a stranger, the visitor need lose no time in getting personally acquainted with the important landmarks of the city. The Chicago River and its two tributaries, the North Branch and the South Branch, divide the city into three parts: North Side, South Side, and West Side. The center of business activity from which radiate the street-car lines and elevated



STATE STREET, CHICAGO

The total length of State Street is 17 miles. Along one mile of this distance is found the greatest shopping district of Chicago.

railways to the three divisions of the city is commonly known as the "downtown district" or the "loop district." The trains on all elevated railways use a common "loop" on Lake Street, Wells Street, Van Buren Street, and Wabash Avenue for the handling of trains and the transfer of passengers. From the loop district, surface cars and elevated trains carry passengers to every part of the city by direct route or easy transfer. All central passenger depots are in or near the loop district.

The visitor will find within the loop, or within easy walking distance, a number of places which will interest him and give him valuable first-hand knowledge of the city. Within or near the "loop" are the leading hotels and theaters; the county courthouse and city hall; the city library; the Art Institute; Field Museum of Natural History; State Street shopping district; and South Water Street, a world-famous market for produce. The North Side street-car lines enable the visitor to



LOOKING NORTH FROM CORNER OF JACKSON BOULEVARD AND DEARBORN STREET, CHICAGO

The striking difference in heights of buildings is evident when seen from above. A crowded business district finds more space by tearing down old, low structures and erecting modern skyscrapers.

reach the Newberry Library, Chicago Historical Library, Lincoln Park, Evanston, and Northwestern University. West Side transportation lines may be taken to Douglas, Garfield, and Humboldt parks, to Oak Park, Riverside, and other suburban towns. South Side lines give ready access to the stockyards and packing houses; to Washington and Jackson parks, the University of Chicago, and South Side suburbs. Electric interurban trains or frequent suburban service on the

steam railroads makes it possible for the visitor to spend a day in any of the interesting suburbs or larger cities within the radius of Waukegan, Elgin, Aurora, Joliet, and Chicago Heights in Illinois, and Hammond, Gary, and Michigan City, Indiana. During the summer season lake excursions may be taken along the lake front within the city limits to Michigan City, Indiana, St. Joseph, Benton Harbor, and Grand Haven, Michigan, and to Milwaukee, the metropolis of Wisconsin.



STATE STREET, CHICAGO, LOOKING NORTH FROM VAN BUREN STREET

The broad street and wide sidewalks make it possible to accommodate the throngs of people who daily visit State Street's famous shopping district.

Whether the visitor plans to stay in Chicago for a few days only, or for a more extended visit, a working knowledge of the geography of the city and the local transportation facilities may be gained by brief visits to a few of the places of general interest in each of the larger divisions of the city.

The outlook.—The rapid growth of Chicago from the time of its earliest settlement to a city of first rank has never been equaled by any other city. Incorporated in 1837, it reached

the 100,000 class of cities in 1860, the 1,000,000 group in 1890, the 2,000,000 group in 1910. London, New York, and Paris are the only larger centers of population today. These three larger cities had centuries of growth to their credit before the white man built his first cabin within the present city limits of Chicago. The problems of development which now confront Chicago are no longer those of pioneer days, but the problems which come to well-established cities of centuries of growth as commercial and industrial centers. Within its area of 200 square miles there is still ample room for growth in all lines of city development. Wise administration of the city government, co-operation among the moral and industrial forces of the city, organization for genuine service to the vast tributary regions, cordial helpfulness to the thousands of visitors, and the individual enterprise of her citizens will give to Chicago as remarkable achievement during the second century of Illinois statehood as during the first.

OTHER CITIES OF THE LAKE BASIN

Along the North Shore.—The distance from the Illinois-Wisconsin boundary line to the city limits of Chicago is 35 miles. The distance between railroad stations along the lake front averages less than two miles. Eight cities along this route had, in 1910, populations varying from 3,168 to 24,978 with a total of 65,000. Smaller communities contained a total permanent population of about 10,000. The next census returns will doubtless show a large increase in the number of people living under the favorable conditions of North Shore cities. The military and naval population of 1918 under the pressure of Great War activities at the Great Lakes Naval Training Station and at Fort Sheridan probably equaled the total permanent population of the North Shore.

Zion City (4,789) is located within three miles of the state line. Founded in 1900, and incorporated in 1902 by John Alexander Dowie and his religious followers, the open country became a thriving city in a remarkably short time. Its most important industry is a lace factory, established at the time the city was founded.

Waukegan (16,069) is the county seat and largest city of Lake County, containing more than one-fourth of the population of the county. Waukegan is served mainly by railroads, but some commerce is carried on by lake.

North Chicago (3,306) adjoins Waukegan on the south and is an extension of the Waukegan industrial district. Its population is growing rapidly.

Great Lakes, just to the south of North Chicago, is the site of the Great Lakes Naval Training Station. The following statements written in the latter part of 1917 show how, through active warfare, Great Lakes became a great center of training:

The history of the Great Lakes Naval Training Station falls naturally into two epochs—the period embraced before the declaration of war and that subsequent.

The station was established by an act of Congress approved April 27, 1904, and ground was broken the following year. In 1911 there were 23 buildings on the station. From a hamlet with 1,500 inhabitants, to a bustling city of more than 15,000 men, has been the growth of Great Lakes since 1916. During the summer months there were about 5,000 tents in the camp, but with the wintry blasts of November the boys were tucked away in the new quarters where 25,000 youngsters can be accommodated comfortably.

Great Lakes today prides itself on being the largest university in the world. Here there is a larger enrollment, more subjects taught, and more faculty experts, than in any other institution of learning on the educational lists.

Great Lakes has the largest single radio district in the United States, and one of the best schools. The communication radius of the station is approximately 2,000 miles, with records of messages as far as Japan, Germany, and Honolulu.

Great Lakes in 1917 became the base of a fleet of training ships which plied the inland seas all summer, taking new crews on practically every trip. More than 50,000 men have been graduated to battleships after receiving their preliminary training at Great Lakes.¹



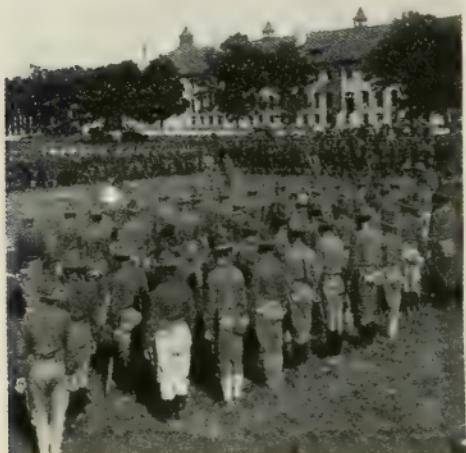
SHILOH TABERNACLE, ZION CITY,
LAKE COUNTY

Zion City was founded in 1900 by John Alexander Dowie and his religious followers. This tabernacle is large enough to seat almost the entire population of the city.

¹ *Souvenir History, U.S. Naval Training Station, Great Lakes.*

The high level of Great Lakes Naval Training Station was reached in August, 1918, when 50,000 men were in training at one time. A total of more than 200,000 received training here during the period of the war. In addition to training seamen, three special schools are organized at the Station: Aviation Mechanics School, United States Naval Radio School, Hospital Corps Training School.

Lake Bluff (726) is a village just south of Great Lakes Naval Training Station.



RESERVE OFFICERS' TRAINING SCHOOL, FORT SHERIDAN, LAKE COUNTY

Lake Forest (3,349) is the seat of Lake Forest University.

Fort Sheridan is a United States reservation on the lake shore formerly used for training men for the United States Army. Soon after the United States entered the great world-war on April 6, 1917, Fort Sheridan was selected as one of the places to train officers for the United States Army. Many thousands of officers have

been given their preliminary training here. Since the close of the war, Fort Sheridan has been transformed into a military hospital.

Highwood (1,219) is just south of Fort Sheridan.

Highland Park (4,209) is the southernmost of the lake-shore cities in Lake County.

Glencoe (1,899), **Winnetka** (3,168), **Kenilworth** (881), and **Wilmette** (4,943) are residential suburbs on the lake shore in Cook County.

Evanston (24,978), situated on the lake shore just north of the city limits of Chicago, is the largest of the North Shore cities of Illinois. It is the seat of Northwestern University.

The 26 miles of lake shore from Evanston to the Indiana state line is occupied by the city of Chicago. In the enlargement of its city limits Chicago has absorbed numerous villages and cities which had their early growth as independent municipalities. After becoming a part of Chicago, the original name still designates the locality, and, in some instances, the name is applied to a branch of the Chicago post-office. Thus the names Rogers Park, Austin, Englewood, Hyde Park, South



OLIVER WENDELL HOLMES SCHOOL, OAK PARK

The thriving suburban cities of Chicago make liberal provision for well-appointed school buildings and spacious school grounds.

Chicago, and many others refer to portions of Chicago which have been annexed from time to time with the growth of the city.

Along the Indiana shore.—East of Chicago, in Indiana, along the south shore of Lake Michigan, are found **Whiting (6,587)**, **Hammond (20,925)**, **East Chicago (19,098)**, **Gary (16,804)**, all within 12 miles of the city limits of Chicago; and **Michigan City (19,207)**, 25 miles beyond Gary. Among these cities Gary has had the most remarkable development and growth. In 1906 the site of Gary was a series of sand dunes along the lake shore. The land had been purchased by the United States Steel Corporation, and building operations were begun

in 1906. A safe, deep, and commodious harbor was constructed; wide streets were laid out; water, gas, and sewer systems were installed; streets and sidewalks were paved in the most modern fashion; blast furnaces and steel mills were pushed to completion; and a great industrial city with iron and steel works as its chief corner stone was established as rapidly as human hands could build it. By 1910 Gary had a population of 16,804, but its growth had hardly begun. Its population in 1920 was 55,000.



HIGH SCHOOL, OAK PARK

This is a township high school supported by Oak Park and River Forest

Cities west of the lake shore.—All cities of Illinois thus far mentioned are on the lake front. West of these, and still in the Lake Michigan Basin, or on the divide between the lake and the Des Plaines River, are found several other cities of some note, all in Cook County. Most of these are close enough to the outskirts of Chicago to appear to be subject to annexation in the future.

Park Ridge (2,009) is at the extreme northwest corner of Chicago.

Oak Park (19,444) is a residential suburb adjoining Chicago on the west. It is nearer the business district of Chicago than are the northern or southern extremities of the city.

Forest Park (6,594) lies directly south of Oak Park.

Cicero (14,557) is a rapidly developing industrial city adjoining Chicago on the west.

Berwyn (5,481) is between Cicero and Riverside.

Morgan Park (3,694) was annexed to Chicago in 1914.

Blue Island (8,043) is on the Little Calumet River.

Harvey (7,227) is a manufacturing city, also on the Little Calumet.

West Hammond (4,948) is near the Indiana state line.

Chicago Heights (14,525) is a manufacturing city 10 miles south of the city limits of Chicago.

A substantial increase in population has taken place in a number of these suburban cities since 1910. The 17 leading cities of the Lake Basin outside of Chicago had in 1910 a population of 150,000; 65,000 were in the 8 cities of the North Shore, and 85,000 in the 9 cities away from the shore, but nearer Chicago in most cases than the lake-shore cities. Only a slight extension of the city limits of Chicago would be required to include 80,000 of the population of these suburban cities.

The predominance of urban conditions in the Lake Basin is due wholly to the development of Chicago as a great commercial and manufacturing center.

CHAPTER XVIII

CITIES OF THE ILLINOIS BASIN

Divisions of the basin.—The Illinois River Basin occupies a broad belt extending entirely across the state in a northeast-southwest direction. In the lake region the basin is divided into two narrower belts; one, occupied by the Des Plaines and Fox river basins, reaching northward into Wisconsin; the other, occupied by the Kankakee Basin, extending eastward into Indiana. These two extensions of the Illinois Basin embrace between them the narrow, populous Lake Michigan Basin of Illinois. The Illinois River Basin comprises 24,040 square miles, or 43 per cent of the area of the state within which are found 49 of the 144 cities of Illinois having a population of 2,500 or more. The cities of the Illinois River Basin may be considered geographically under five divisions: (1) cities of the Des Plaines and Fox river basins; (2) cities of the Kankakee Basin; (3) cities along the Illinois River; (4) cities north and west of the Illinois River; (5) cities south and east of the Illinois River.

Cities of the Des Plaines and Fox river basins.—The largest village in Lake County, not located on the lake front, is **Libertyville (1,724)**. Villages near the numerous lakes of the county not only serve the rural communities, but they are sought as summer resorts by many people from Chicago and other cities. **Antioch (682)**, **Grays Lake (603)**, **Fox Lake (400)**, **Lake Zurich (304)**, are among the principal villages of the district.

In northern Cook County are found **Barrington (1,444)**, **Palatine (1,144)**, and **Arlington Heights (1,943)**.

In Cook County, along the Des Plaines River, there are a number of residential suburbs with excellent rapid-transit lines to Chicago. **Des Plaines (2,348)** is within five miles of the city limits of Chicago. **River Forest (2,456)** adjoins Oak Park on the west and is situated on the east bank of the Des Plaines; **Melrose Park (4,806)** and **Maywood (8,033)** are

immediately west of the river beyond River Forest. Oak Park and these three other suburbs form a compact area wholly tributary to the city of Chicago, and well favored with steam, electric, and elevated railroads. A few miles farther south is **Riverside (1,073)**, just west of which lies **La Grange (5,282)**. At the western border of Cook County is **Lemont (2,284)**.

To the west of the Des Plaines River, but within the Des Plaines Basin, a number of attractive cities are to be found in Dupage County. All are located where good railroad service is provided, and all are within the suburban influence of the metropolis on the lake shore. Among these the more important are: **Glen Ellyn (1,763)**, **Elmhurst (2,360)**, **Wheaton 3,423**), the county seat of Dupage County and the seat of Wheaton College, **West Chicago (2,378)**, **Hinsdale (2,451)**, **Downers Grove (2,601)**, and **Naperville (3,449)**. More than one-half of the population of Dupage County resides in these seven cities.

On the Des Plaines River in Will County are **Lockport (2,555)** and **Joliet (34,670)**. The first locks in the Illinois and Michigan Canal are at Lockport, 28 miles from the junction of the canal with the South Branch of the Chicago River. Here, also, are the controlling works and the hydroelectric power plant of the Chicago Drainage Canal.

Joliet, 40 miles southwest of Chicago, is the seventh city in the state in population. More than 40 per cent of the people of Will County live in this one city. Here are the extensive works of the Illinois Steel Company. The northern Illinois State Penitentiary is located here. A dam across the Des Plaines River provides water-power. The outer belt railroad of Chicago encircles that city from the lake at



ILLINOIS STEEL COMPANY'S WORKS, JOLIET

The four blast furnaces of this plant have a total daily capacity of 2,000 tons of pig iron.

Waukegan through Joliet to the lake again at Gary, Indiana, thus crossing every railroad that enters Chicago.

The important cities of the Fox River Basin are in Kane County situated in the immediate vicinity of the river along 25 miles of its course, a distance somewhat less than the north-south extent of Chicago. In order from north to south, these cities are: **Elgin (25,976)**, **St. Charles (4,046)**, **Geneva (2,451)**, **Batavia (4,436)**, and **Aurora (29,807)**. Elgin is eleventh and Aurora is ninth in population among the cities of Illinois. The 66,716 inhabitants of these five cities comprise 72 per cent of the population of Kane County. They are about 40 miles distant from Chicago, and, with Joliet and Chicago Heights, they mark the outer limit of definite suburban influence of the great metropolis. Although local interests and local industries are stronger than Chicago influences on this outer circle of cities, yet hundreds of persons who reside in these cities go daily to their work in the busy mart forty miles away.

Elgin is the seat of one of the state hospitals. The extensive factories of the Elgin National Watch Company are in Elgin. The school for delinquent boys is located at St. Charles, and the school for delinquent girls at Geneva. Geneva, the smallest of the five cities, is centrally located along the valley in Kane County, and it is the county seat. Aurora has important railroad shops and numerous factories.

Only one other city in the Fox River Basin, **Sandwich (2,557)**, DeKalb County, has a population of more than 2,500. **Yorkville (431)**, Kendall County, is the smallest county seat in Illinois. Numerous villages along the railroads and a number situated a few miles from a railroad, serve the commercial needs of the farming communities in which they are located.

Cities of the Kankakee Basin.—The Kankakee River rises near South Bend, Indiana, and enters Illinois in Kankakee County. Along the Kankakee in Illinois are: **Momence (2,201)**, **Kankakee (13,986)**, and **Wilmington (1,450)**. On the Iroquois River, a southern tributary of the Kankakee, is **Watseka (2,476)**, the county seat of Iroquois County. Near Momence is one of the noted agricultural experiment fields

where scientific soil treatment changed the corn yield from less than 4 bushels per acre to more than 70 bushels. Kankakee is the county seat of Kankakee County. One of the state hospitals is located here. A dam across the Kankakee River furnishes water-power. Just north of Kankakee is **Bradley** (1,942), an industrial suburb, and a mile or so beyond Bradley is **Bourbonnais** (611). A denominational college has been established here.

Cities along the Illinois River.—The Illinois River and the Illinois Valley may be divided into three portions: (1) the Upper Illinois extending from the confluence of the Kankakee and Des Plaines rivers to the Great Bend at Hennepin, a distance of 63 miles; (2) the Middle Illinois from the Great Bend to Pekin, 56 miles; and (3) the Lower Illinois from Pekin to the Mississippi, 159 miles.

Seven cities, each having a population of 2,500 or more, and a combined population, in 1910, of 47,139, are located along the Upper Illinois; three such cities with a total of 79,515 inhabitants are situated along the Middle Illinois; and two along the Lower Illinois comprising a population of 9,632. The total population of these 12 cities in 1910 was 136,286, with 49 per cent of this number in the single city of Peoria. Seventeen villages having populations between 450 and 1,600, with a total population of 18,794, are found along the Illinois River. The location of these cities and villages was determined by the presence of river terraces high enough to avoid disastrous floods and at such places that the wagon roads from the uplands could find an approach to the river front.

In the Upper Illinois Valley the river is paralleled on the north side by the Illinois and Michigan Canal, and settlements were readily established along the canal at frequent intervals.

About 10 miles below the junction of the Des Plaines and Kankakee rivers is **Morris** (4,563), the county seat of Grundy County.

In La Salle County settlements are numerous along the valley. Near the eastern edge of the county is **Seneca** (1,120). At **Marseilles** (3,291), where the fall in the river is 18 feet in $1\frac{1}{2}$ miles, there has been built a dam for water-power. This power is used in operating factories and in generating electricity

for an electric railroad. **Ottawa (9,535)** is the county seat of La Salle County. Plate-glass and clay products are among its manufactures. **Utica (1,250)** has one of the few natural cement factories in the United States.

La Salle (11,537), **Peru (7,984)**, and **Oglesby (3,194)** in the western part of La Salle County are known as the "tri-cities." La Salle and Peru are on the north side of the river at the terminus of the Illinois and Michigan Canal. Oglesby is on the

south side of the Illinois in the valley of the Vermilion River. Oglesby is the name of the post-office and railroad station, although the city is incorporated under the name of Portland. Portland cement is the chief manufactured product. Zinc-smelting is the important industry of La Salle and Peru. A large Portland-cement factory is in operation in La Salle. Several coal mines are operated in the vicinity of the tri-cities. The cities and villages of the Illinois Valley in La

"BIG BEN" TIMING-ROOM, WESTERN CLOCK COMPANY, PERU, LA SALLE COUNTY

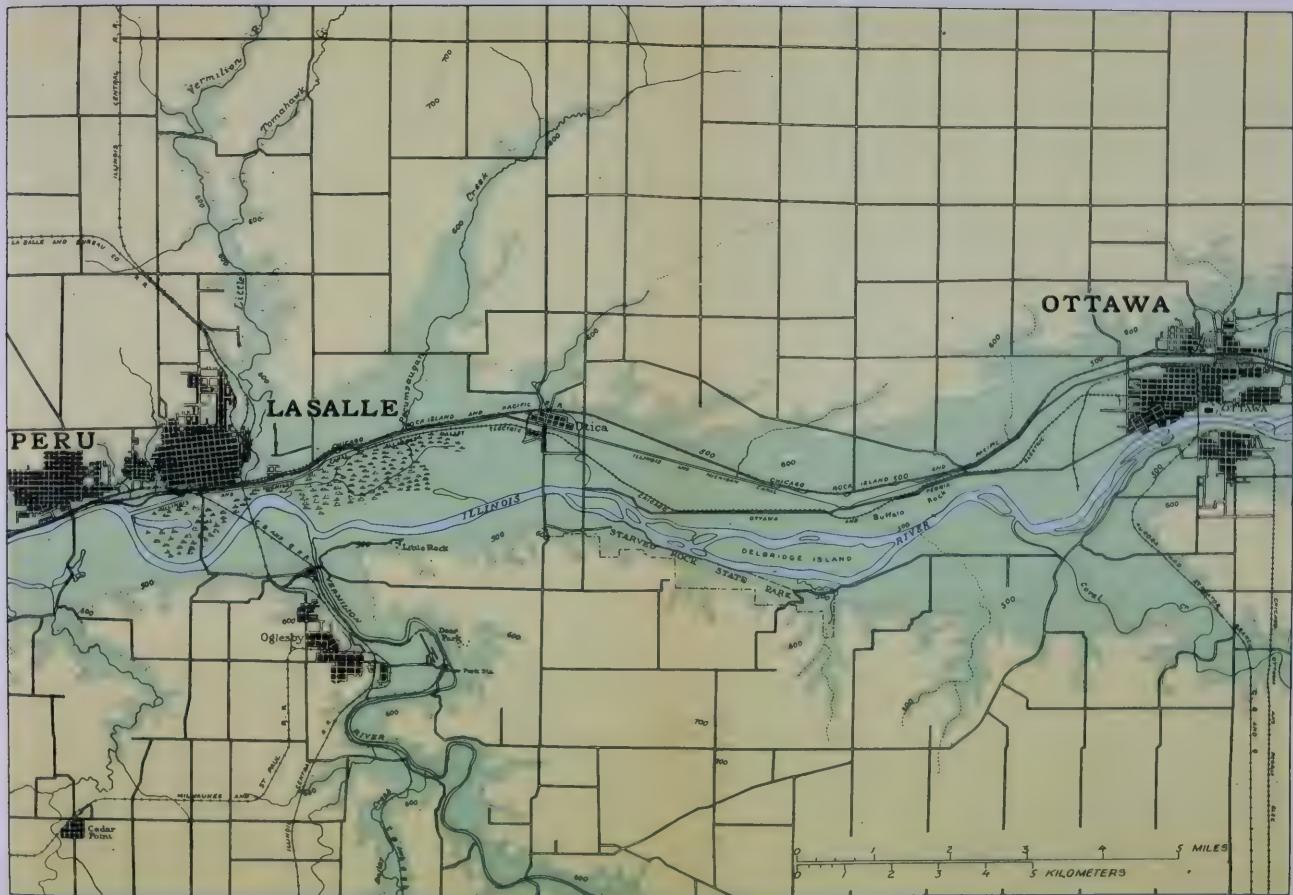
"Big Ben," an alarm clock of moderate price, has found its way into all parts of the United States and to many foreign countries. In the "timing-room" the clocks are given their final tests before placing them on the market. (Copyright by Keystone View Company.)

Salle County contain 42 per cent of the population of the county. If to these we add Streator and Mendota we find 62 per cent of the population of the county living in cities.

Spring Valley (7,035) is a coal-mining center and the largest city in Bureau County. **Depue (1,339)** has recently established a zinc smelter, and is therefore growing in population.

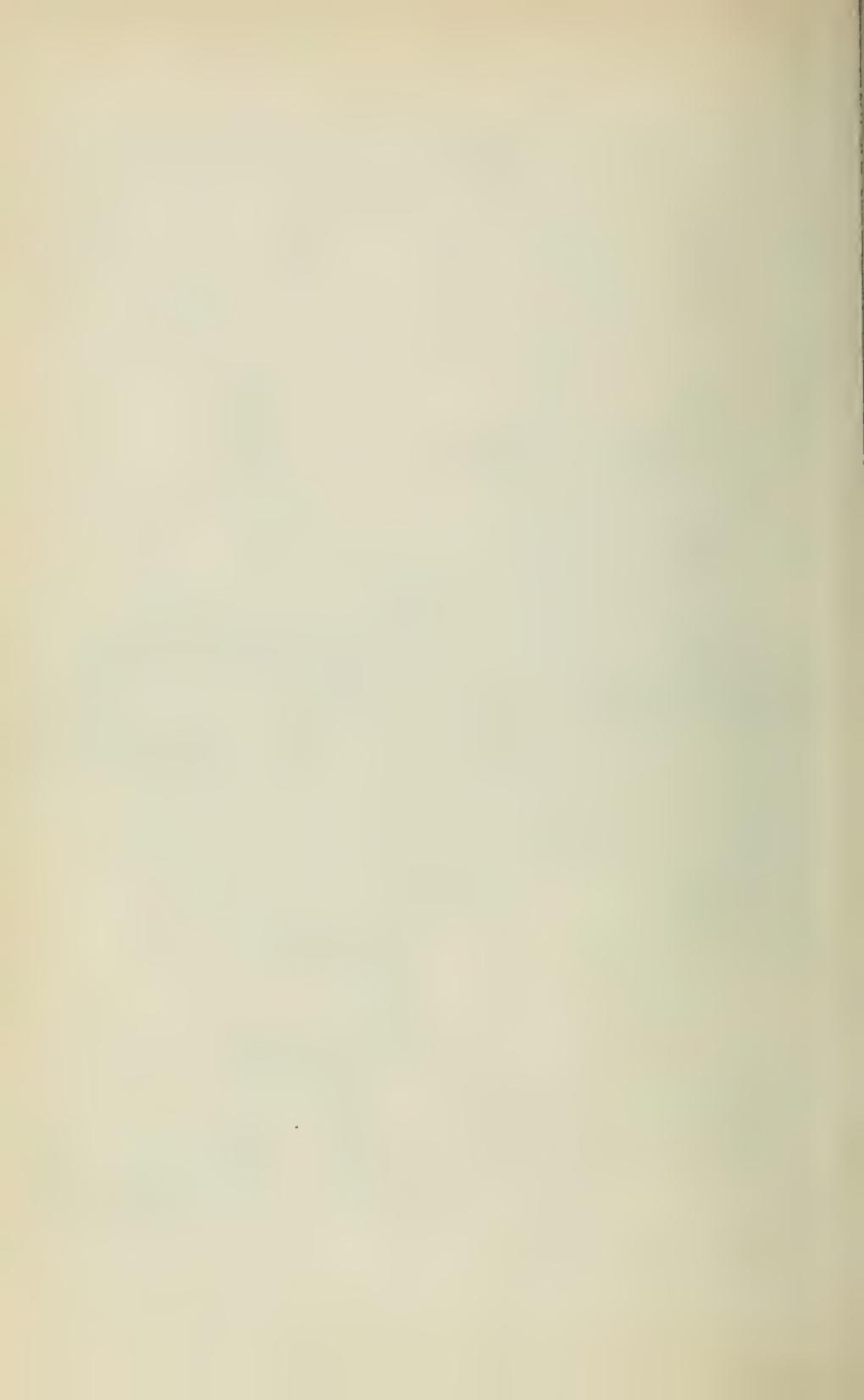
Along the Middle Illinois are found **Hennepin (451)**, **Henry (1,657)**, **Lacon (1,495)**, **Chillicothe (1,851)**, **Peoria Heights (583)**, **Averyville (2,668)**, **Peoria (66,950)**, **East Peoria (1,493)**, **Bartonville (1,536)**, and **Pekin (9,897)**. Five of these—Chilli-

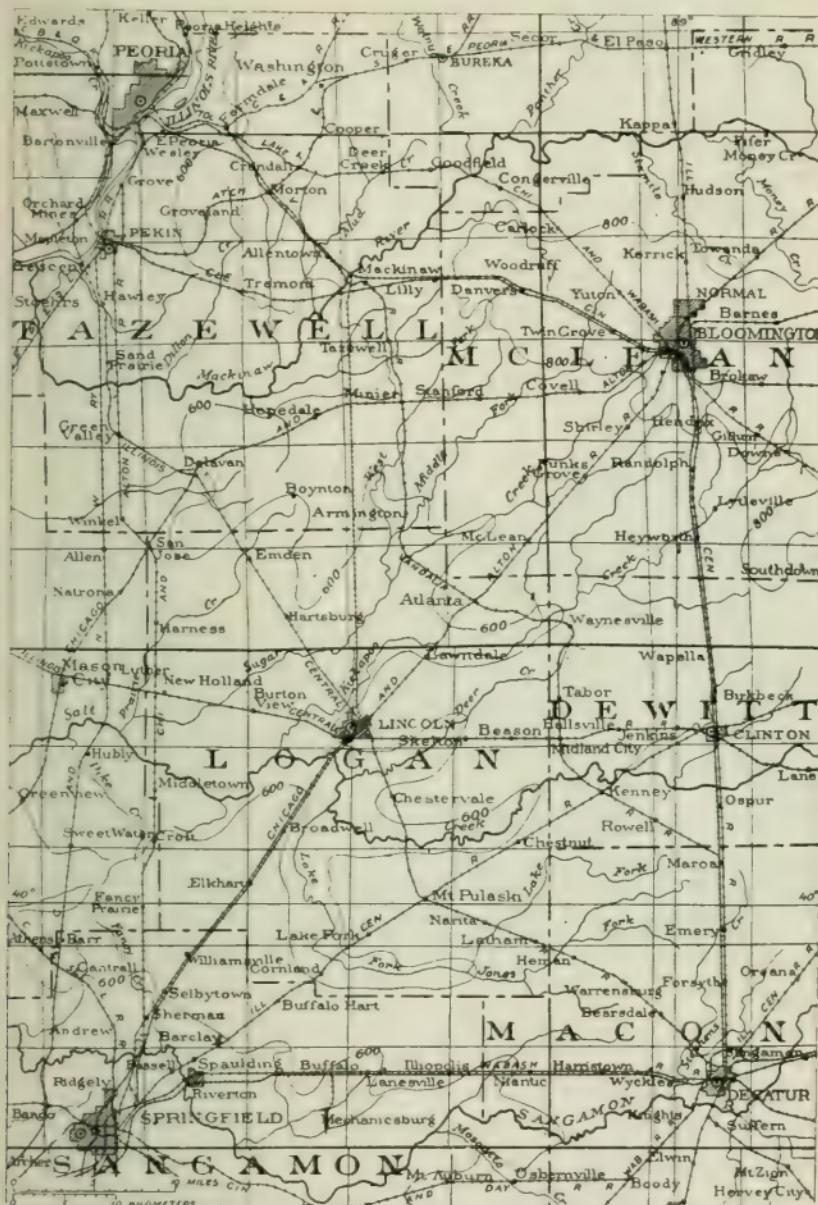




MAP OF ILLINOIS RIVER VALLEY, OTTAWA TO PERU

The valleys of the Illinois River and its tributaries are here bordered by steep bluffs of St. Peter sandstone. Beyond the bluffs are the level prairie lands characteristic of the region.





MAP SHOWING PEORIA, BLOOMINGTON, DECATUR, AND SPRINGFIELD

The quadrangle here represented is about 50 miles by 75 miles in size. It contains 5 per cent of the land area of the state. Its four larger cities are connected by the Illinois Traction System, the Peoria-Springfield line passing through Lincoln and extending beyond the limits of the map to St. Louis.

cothe, Peoria Heights, Averyville, Peoria, and Bartonville—are in Peoria County, and their combined population constitutes 73 per cent of the population of the county. Peoria Heights, Averyville, Peoria, and Bartonville form a single urban area on the west side of the river, and Peoria street-car service extends to East Peoria on the east side of the river. These five cities form a single industrial community and their combined population comprises 48 per cent of the total population of 29 cities and villages, each with a population of more than 450, along the 278 miles of the Illinois River. Pekin is on the east side of the river ten miles below Peoria. The transport

service between Pekin and Peoria brings Pekin within the Peoria industrial district. With this added population, 54 per cent of the inhabitants of the cities and villages of the Illinois Valley are to be found in the Peoria district, extending along the course of the river for a distance of about 15 miles.



UPPER ENTRANCE TO GLEN OAK PARK, PEORIA

Glen Oak Park on the bluffs of the Illinois Valley and Bradley Park along Dry Run are the two large parks of Peoria. Grand View Drive passes through Glen Oak Park.

of the Illinois Valley, the most important city in it. Natural conditions provided at Peoria favorable opportunity for crossing a wide river. Farm Creek, entering the river opposite Peoria, with its swift current in flood times, carried great loads of sediment from the hills of the Bloomington terminal moraine into the sluggish waters of the Illinois River. This sediment accumulated in the form of an alluvial fan on the east side of the river. The building of this fan made the river narrow at this point, and by partially damming the river, Lake Peoria was formed as a widened portion of the river, extending upstream to Chillicothe, a distance of 20 miles. Below Peoria the river is everywhere wider and more difficult to cross than at Peoria.

Peoria has been, from the earliest settlement

Opposite the Farm Creek fan is an extensive river terrace, easy of access from the river front, and well above serious flood dangers. Upon this terrace Peoria was established. As the city grew the terrace was fully occupied. Now it extends up the "West Bluffs" and spreads out on the extensive upland beyond. In pioneer days a river ferry at Peoria marked a very important break in transportation. A ferry is more easily



COURTHOUSE AND PRINCIPAL BUSINESS STREET OF PEORIA

Peoria's largest business houses are around or near the courthouse square

established and more readily maintained where the stream is narrow. No other point along the Illinois River for a distance of more than 200 miles offered a crossing as favorable as the one at Peoria. Wagon bridges and railroad bridges could span the river more readily at Peoria than elsewhere below the Great Bend. The coming of the railroad, therefore, increased Peoria's importance, and it became the chief railroad center of the interior of the state, surpassed only by Chicago on the

lake and East St. Louis, the front door of St. Louis, on the Mississippi. Peoria is the home of Bradley Institute, one of the important schools of the state for technical training.

Along the Lower Illinois are found **Havana (3,525)**, county seat of Mason County, **Bath (475)**, **Beardstown (6,107)**, the largest city of Cass County, **Meredosia (951)**, **Naples (457)**, **Pearl (842)**, **Kampsville (506)**, **Hardin (654)**, county seat of Calhoun County, and **Grafton (1,116)**, located 24 miles above St. Louis at the junction of the Illinois and Mississippi rivers. Fishing is an important industry along the middle and lower portions of the Illinois River. The principal fish markets are Peoria, Pekin, Havana, and Beardstown, but important

fishing operations are also carried on from the villages along the river.



RAILROAD STATION, TOULON, STARK COUNTY

The passenger station at the right and the freight depot and grain elevator at the left indicate a thriving town and a prosperous agricultural region.

grain elevators and with commercial houses to care for the local trade in staple articles of food, clothing, fuel, building materials, farm machinery, and repair work. Prosperous villages are found in which no important manufacturing is carried on. The establishment of factories leads to increased population and business activity in general. Radiating railroads make possible the development of the wholesale business in various lines of merchandise, especially in staple articles of food.

The region north and west of the Illinois River has seven cities with populations of 2,500 or more, and numerous other smaller cities and villages of great importance to their immediate localities. **Mendota (3,804)** has three important railroads.

Cities north and west of the Illinois River.—The location of cities on the level uplands of Illinois is determined by railroad facilities. The cities and villages have many things in common. Each is a railroad station with one or more

Princeton (4,131), the county seat of Bureau County, with but one steam railroad, is connected with the cities of the Upper Illinois Valley by an electric railroad.

Kewanee (9,307) and **Galva** (2,498) are very near the divide between the Illinois and the Mississippi rivers. They are connected by an electric railroad. Kewanee has one of the largest tube works in the country.

Toulon (1,208) is the county seat and **Wyoming** (1,506) the largest city of Stark County.

Galesburg (22,089), the county seat of Knox County, is the largest city and most important railroad center of the uplands between the Illinois and Mississippi rivers. It has railroad

shops and is the seat of Knox College and Lombard College. Almost one-half of the population of Knox County live in Galesburg.

Abingdon (2,464) is the seat of Abingdon College and Hedding College. **Farmington** (2,421) is a coal-mining center.

Canton (10,453) manufactures agricultural implements extensively. **Lewistown** (2,312) is the county seat of Fulton County.

Macomb (5,774), the county seat of McDonough County, is the seat of the Western Illinois State Normal School. **Bushnell** (2,619) is an important railroad center.

Carthage (2,373), the county seat of Hancock County, is located near the westernmost part of the Illinois River Basin. **Rushville** (2,422), the county seat of Schuyler County, is the terminus of a railroad branch line. **Mount Sterling** (1,986) is the county seat of Brown County.

Cities south and east of the Illinois River.—Since the Illinois River lies nearer the northern and western edge of its basin, the area now to be considered is larger in extent than



CHRISTIAN CHURCH, MINIER, TAZEWELL COUNTY

The churches are among the attractive public buildings in all Illinois villages and cities.

the one previously discussed. The favorable surface for the building of railroads in any desired direction, the high fertility and consequent large crops of the farm lands, the abundance of coal, the favorable conditions for manufacturing, and the ease of transportation across the low divides to and from the basins to the east and south are factors which have operated to give this region a large number of villages and first-class cities. The

region contains 16 cities, each having a population, in 1910, of 2,500 or more. Six of these have a total population of 149,057, and the 16 cities a total of 188,508. Numerous smaller cities with populations of 1,000 to 2,500 are found within the area.



COURTHOUSE, BLOOMINGTON, MCLEAN COUNTY

Braidwood (1,958), in Will County, and **Coal City** (2,667), in Grundy County, are near the northern margin of Illinois coal fields. **Dwight** (2,156), in Livingston County, has been widely known as the seat of the Keeley Institute for the cure of alcoholism.

The divide between the two Vermilion River basins, the Illinois-Vermilion and the Wabash-Vermilion, is in the southern edge of Livingston County. Along the Illinois-Vermilion are **Fairbury** (2,505), **Pontiac** (6,090), **Streator** (14,253), and near its junction with the Illinois, Oglesby, already mentioned among the cities along the Illinois River. Pontiac is the seat of the Illinois State Reformatory. Streator is important as a coal-mining and glass-manufacturing center.

The principal cities in Woodford County are **Minonk** (2,070), which has important coal mines, **El Paso** (1,470), and **Eureka**

(**1,525**), the county seat, at which Eureka College is located. **Washington** (**1,530**) is in Tazewell County.

Bloomington (**25,768**) and **Normal** (**4,024**) are the largest cities in McLean County. Bloomington has large railroad shops and a coal mine. It is the seat of the Illinois Wesleyan University. Normal is the seat of the Illinois State Normal University and of the Soldiers' Orphans' Home. Other cities in the same county are **Chenoa** (**1,314**), **Lexington** (**1,318**), and **Le Roy** (**1,702**). **Gibson City** (**2,086**) is in Ford County.

Clinton (**5,165**), the county seat of DeWitt County, is an important railroad center.

Lincoln (**10,892**), the county seat of Logan County, has important coal mines. It is the seat of the state school for feeble-minded children. The Odd Fellows Orphans' Home is located here.

Mason City (**1,842**) in Mason County, **Mount Pulaski** (**1,511**) in Logan County, **Monticello** (**1,981**), the county seat of Piatt County, and **Bement** (**1,530**) are important trading points for their various communities.

The Sangamon River Basin is an important part of the region under discussion. A number of the cities already mentioned are within the basin. Along or near the course of the main stream are Decatur, Springfield, and Petersburg.

Decatur (**31,140**) is the county seat of Macon County. It has important coal mines and railroad shops, and is the seat of the James Millikin University.



COURTHOUSE, FORMER STATE CAPITOL, SPRINGFIELD, SANGAMON COUNTY

This building, erected and used as the state capitol, when outgrown for state purposes became the county courthouse. It is located in the center of the business district.



LINCOLN'S HOME, SPRINGFIELD

This home was purchased by Mr. Lincoln in 1844. In 1887 it was presented to the state by his son, Robert Lincoln. It is open to visitors.

world as the home and burial place of Abraham Lincoln. The only residence ever owned by Abraham Lincoln is in Springfield at the corner of Eighth and Jackson streets. He purchased it in 1844. In 1887, after the death of Mrs. Lincoln, Robert Lincoln, the son, presented the home to the state to be kept as a memorial of Abraham Lincoln. More than 30,000 persons visit this home annually.

President Lincoln was assassinated April 14, 1865, and died on the following day. His remains were brought to Springfield. The Lincoln monument stands on an

Springfield (51,678) is the capital of Illinois and the county seat of Sangamon County. It ranks fourth in population among the cities of the state, being exceeded by Chicago, Peoria, and East St. Louis. It is an important railroad, coal-mining, and manufacturing center. The State Fair Grounds are located here. Springfield is known throughout the



LINCOLN MONUMENT, SPRINGFIELD

This monument was erected by contributions from individuals and organizations throughout the United States. It is now in the custody of the state. Within the base is a large room known as Memorial Hall which contains many articles associated with the life of Lincoln. A custodian is always present to explain the exhibits to visitors.

eminence in Oak Ridge Cemetery. It was begun in 1869 and dedicated in 1874. Built by popular subscription, the monument and grounds have been presented to the state for permanent care and custody.

On May 7, 1917, one month after the United States had entered the world-war, the French Commission to the United States visited Lincoln's tomb, and Marshal Joffre, the hero of the Marne, laid a bronze wreath, the gift of the French people, on Lincoln's tomb.

Petersburg (2,587) is the county seat of Menard County, and **Virginia** (1,501) is the county seat of Cass County.

Jacksonville (15,326), the county seat of Morgan County, is the seat of Illinois College and Illinois Woman's College. Three state charitable institutions are located at Jacksonville: the Illinois School for the Deaf, the Institution for the Blind, and a state hospital. **Winchester** (1,639) is the county seat of Scott County.

Taylorville (5,446), the county seat of Christian County, is widely known as the home of the *School News*, an educational magazine.

Virden (4,000) is an important coal-mining center. **Carlinville** (3,616), the county seat of Macoupin County, has coal mines, and it is the seat of Blackburn College.

Roodhouse (2,171) has coal mines. **Whitehall** (2,854) is an important center for the manufacture of pottery and sewer pipe. **Carrollton** (2,323) is the county seat of Greene County.

Jerseyville (4,113) is the county seat of Jersey County.

Summary.—The greater number of villages and cities in the Illinois River Basin are located with reference to the needs of the rural population in their immediate vicinities.



BUSINESS SQUARE, WINCHESTER, SCOTT COUNTY

In the county seats of Illinois the most important business houses are usually located "on the square" surrounding the county courthouse.

Coal-mining adds to the importance of a number of the cities, but the chief centers of coal production in Illinois lie south of the Illinois Basin. A few of the larger cities of the region with good transportation facilities have established wholesale houses and important factories. The cities of the Illinois River Basin are dependent largely on the agricultural activities of the area, while the cities of the Lake Michigan Basin are almost wholly dependent on the commercial and industrial activities of the region.

CHAPTER XIX

OTHER CITIES OF ILLINOIS

The area and its divisions.—The cities of the state not treated in previous chapters will be included in this chapter. The region includes those portions of the state bordering on the Mississippi, Ohio, and Wabash rivers, and extending back to the divides between these basins and the Illinois Basin.

It comprises the drainage basins of the Rock, Kaskaskia, Big Muddy, Ohio, and Wabash rivers, and also the minor basins of the Mississippi. The total area is 31,238 square miles, or about 56 per cent of the area of the state.

Cities of northwestern Illinois.—The northwestern part of the state, between the Rock River Basin and the Mississippi River, is drained directly into the Mississippi through small streams, the Galena River being most important.

Galena (4,835), the county seat of Jo Daviess County, is the largest city of this area. It is the center of the lead- and



GIANT'S TABLE, MOUNT CARROLL, CARROLL COUNTY

The rugged regions in the Driftless Area of northwestern Illinois are similar in general topography to the Ozarks of southern Illinois.

zinc-mining of Illinois. **Savanna** (3,691), the largest city of Carroll County, is situated on the Mississippi River. **Mount Carroll** (1,759) is the county seat of Carroll County. **Fulton** (2,174), in Whiteside County, is on the Mississippi opposite Clinton, Iowa (25,577).



TENTH AVENUE FROM FIFTH STREET, FULTON,
WHITESIDE COUNTY

The well-shaded streets of Illinois towns, large and small, show that the soil and climate of the Prairie State are favorable for rapid growth of forest trees.

tion of 2,500 or more are located within the basin and three others are situated at the edge of the basin on the Mississippi River. The total population of these fifteen cities in 1910 was 164,058, and important increases have taken place since that date.

Freeport (17,567), the county seat of Stephenson County, is located on the Pecatonica River, a tributary of Rock River. It is an important railroad and manufacturing center with 48 per cent of the population of Stephenson County.

Rockford (45,401), the county seat of Winnebago County, is on the Rock River. It is the fifth city in the state in popu-

Cities of the Rock River Basin.—The Rock River Basin in Illinois contains 5,310 square miles, or nearly 10 per cent of the area of the state. Twelve cities having a popula-



BRIDGE OVER MISSISSIPPI RIVER AT FULTON,
WHITESIDE COUNTY

Railroad bridges across the Mississippi River are common above St. Louis, while below St. Louis, where the river and flood plain are wider, there are but few bridges.

lation, and 72 per cent of the people of Winnebago County live in Rockford.

Camp Grant was established on the east side of Rock River just below Rockford soon after the United States entered the world-war against Germany. In a few weeks' time a military city was constructed capable of housing a population equal to that of the city of Rockford. From September, 1917, when the cantonment was first opened, to the close of the war, Camp Grant was the busiest center of activity in Rock River Basin. Here the soldiers were given the intensive training necessary to make them the best fighters of modern warfare. The topography of the region of Camp Grant presents features of some military importance.

If the area is looked upon from the point of view of military operations, there are some significant features, though none of a commanding character.

The Rock, the Pecatonica, the Kishwaukee, and the Sugar rivers all are large enough to interfere with the crossing of men or wheels, except where they are bridged. Bridges are destroyed easily, so that problems of stream crossings are serious, as the Austrians found in their early attempts (1914) to cross the Save and the Danube, into Serbia. The Rock, though a small stream as compared with some of those which have played an important part in the European conflict, is too large in most places to be forded at any time.

The valleys of some of the larger rivers of western France, as the Somme, have low flood plains which offer problems similar to those of the Pecatonica.

The Kishwaukee and Rock rivers afford opportunity for the study of problems in crossing streams where bridges are wanting, but where the bottom is firm. The valley of the Pecatonica offers excellent opportunity for the study of the many problems which armies might encounter in the field,



SCENE IN PARK, GENESEO, HENRY COUNTY

in crossing wet, marshy and flooded tracts, and in crossing streams with soft, muddy bottoms.

The utilization of steep slopes can be studied to good advantage along the Kishwaukee above Camp, and along the Rock below the Kishwaukee.

If this region were the scene of such conflicts as northern France, one of the great and immediate problems would be the construction of roads—roads which would be serviceable in all sorts of weather, for all sorts of traffic. Fortunately material for the betterment of the roads is at hand. Limestone underlies most of the region, and limestone, crushed and properly applied, makes excellent road metal.



ROCK RIVER, NEAR OREGON, OGLE COUNTY

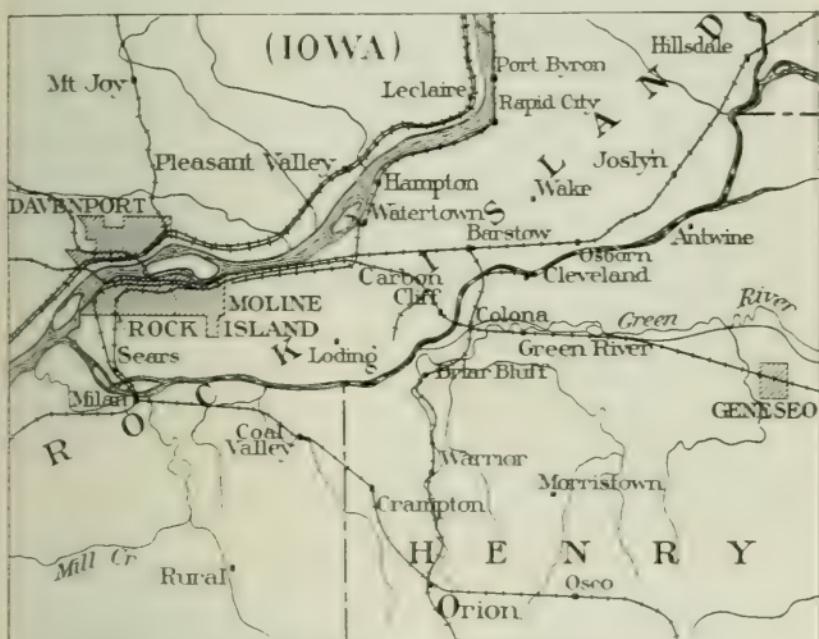
The scenery along Rock River in Ogle County is similar to that along the Illinois River in La Salle County. In both regions the streams have cut their valleys into St. Peter sandstone, and similar topographic forms have resulted.

Trenches could be made in some of the mantle rock easily and in some of it only with more or less difficulty. Trenches in some sorts of material would drain readily, while in some drainage would need to be provided with much care. Trench walls would stand much better in some sorts of material than in others. Problems involving these elements can be studied to good advantage close to Camp.

Tunneling and mining have been important in some places in the European battle-fields, both in Italy and France. The steep slopes of the Rock below the Kishwaukee afford opportunity for practice in tunneling in rock which is excavated rather easily. Problems in the timbering of tunnels or other excavations also could be studied.¹

¹ R. D. Salisbury and H. H. Barrows, *The Environment of Camp Grant*, Bulletin No. 39, State Geological Survey.

The Kishwaukee River Basin occupies that part of the Rock River Basin lying east of Rockford, extending from the state line to DeKalb. The principal cities within this area are **Harvard** (3,008), **Woodstock** (4,331), **Marengo** (1,934), **Belvidere** (7,253), **Sycamore** (3,926), and **DeKalb** (8,102). Woodstock is on the divide between the Rock and the Fox river basins. Belvidere is the county seat of Boone County,



MAP OF ROCK ISLAND DISTRICT

Rock Island, Moline, and Davenport form an industrial center known as the "tri-cities." A United States arsenal is located on the island in the Mississippi River between Rock Island and Davenport. (Scale 1 inch to 8 miles.)

and Sycamore of DeKalb County. DeKalb is the seat of the Northern Illinois State Normal School.

Rochelle (2,732) is the largest city in Ogle County, and **Oregon**, on Rock River, is the county seat.

Dixon (7,216), on Rock River, is the county seat and largest city in Lee County. **Amboy** (1,749) is located near the center of Lee County.



BIRD'S-EYE VIEW OF ROCK ISLAND

Rock Island is one of the important manufacturing cities of Illinois. Looking east from Seventh Street and Second Avenue one sees this view. The dome of the courthouse is to the right and the government bridge from Rock Island Arsenal to Davenport is to the left.



VIEW ACROSS MISSISSIPPI RIVER FROM ROCK ISLAND PLOW WORKS

The Mississippi River flows westward past Rock Island. Thus Davenport, which can be seen across the river, lies north of Rock Island. The bluffs, lying within a half-mile of the water's edge, can be seen in the distance.

Sterling (7,467) and Rock Falls (2,657) are located on opposite sides of Rock River in the eastern part of Whiteside County. Water-power has been developed here. Morrison (2,410) is the county seat of Whiteside County.

Rock Island (24,335), Moline (24,199), and East Moline (2,665) form a compact urban district located on the Mississippi River just above the mouth of Rock River. With Davenport, Iowa (43,028), on the opposite bank of the Mississippi, this urban district has a population of nearly 100,000. The United States Arsenal is located on an island in the river at this point. Rock Island is the county seat of Rock Island County. Rock Island and Moline manufacture agricultural implements on a large scale. The combined population of Rock Island, Moline, and East Moline comprises 70 per cent of the population of the county.

A state hospital is located at Watertown (525), a village on the Mississippi just above East Moline.

Cities between Rock and Illinois rivers.—The strip of land along the Mississippi between the mouth of Rock River and the mouth of the Illinois, including about one-half of the length of the state, and extending eastward to the divide between the Mississippi and the Illinois, is a narrow irregular strip varying from about two miles in width in Calhoun County



FORT ARMSTRONG BLOCKHOUSE

Old Fort Armstrong is situated on an island in the Mississippi River between Rock Island and Davenport. It was built in 1816 and named for the then Secretary of War. The fort shown here is a reproduction of the earlier one. It was built in 1916, the centennial year of the founding of the fort.

to sixty miles in Mercer and Henry counties. In Hancock County the divide approaches within eight miles of the Mississippi. This area contains two cities of considerable size, Quincy and Monmouth, while Galesburg and Galva are situated on the divide. Along this stretch of the Mississippi are found three important cities in Iowa: **Burlington (24,324)**, **Fort Madison (8,900)**, and **Keokuk (14,088)**; also **Hannibal (18,341)** and **Louisiana (4,454)** in Missouri.

Aledo (2,144), the county seat, and **Keithsburg (1,515)**, on the Mississippi, are the principal towns in Mercer county. **Oquawka (907)**, the county seat of Henderson County, is a river port.

Monmouth (9,128), the county seat of Warren County, is an important railroad center and manufactures pottery.



A WELL-SHADED STREET, PITTSFIELD,
PIKE COUNTY

This scene shows the luxuriant growth of trees commonly found along the streets and in the parks of Illinois cities.

although only 12 miles from the Mississippi, lies in the Illinois River Basin. **Hamilton (1,627)** is on the Mississippi directly west of Carthage and opposite Keokuk, Iowa. It lies at the Illinois end of the great water-power dam built across the Mississippi between Hamilton and Keokuk. Below Hamilton, Illinois lies opposite Missouri. **Warsaw (2,254)** is on the Mississippi 3 miles below Hamilton.

Quincy (36,589), the county seat of Adams County and sixth city of the state, is next to Peoria and East St. Louis in population among the river ports of Illinois. It contains 56 per cent of the population of Adams County. Stoves and

Nauvoo (1,020), on the Mississippi in Hancock County, is the largest river port in Illinois without a railroad. In 1844, at the height of Mormon prosperity in Illinois, Nauvoo was a city of 16,000 inhabitants.

Carthage, the county seat of Hancock County,

furnaces are among its leading manufactures. It is the seat of the Illinois State Soldiers' and Sailors' Home.

Pittsfield (2,095) is the county seat of Pike County. It is the terminus of a branch line of railroad.

Cities between the Illinois and Kaskaskia rivers.—Of the numerous small streams flowing directly into the Mississippi between the Illinois and Kaskaskia, the most important is Cahokia Creek, whose basin includes portions of Macoupin, Madison, and St. Clair counties. In the upper part of its basin



VIEW ALONG PAINTER CREEK, PITTSFIELD, PIKE COUNTY

A typical scene along a creek in level country. Cutting of banks is going on at one place, deposits are made at another, and the influence of vegetation in retarding erosion is also shown.

are three important mining centers of Macoupin County: **Gillespie (2,241)**, **Benld (1,912)**, and **Staunton (5,048)**.

Edwardsville (5,014), the county seat of Madison County, is on the middle portion of Cahokia Creek. It was one of the most important settlements in the early history of the state.

Alton (17,528) is located on the Mississippi about midway between the mouth of the Illinois River and East St. Louis. It is the largest city of Madison County. It has numerous railroads and is an important manufacturing center. **Upper Alton (2,918)** is directly east of Alton, and was annexed to Alton in 1911. It is the seat of Shurtleff College and of the

Western Military Academy. **East Alton (584)** adjoins Alton, and during the war built extensive munition works.

Wood River, about 3 miles below Alton, was a village of less than one hundred in 1910. The establishment of an oil refinery has increased its population to more than three thousand.

Granite City (9,903), **Madison (5,046)**, and **Venice (3,718)** in Madison County form a compact industrial area. **Collins-**

ville (7,478) has zinc smelters. **Highland (2,675)**, in the eastern part of the county, is in the Kaskaskia Basin. Sixty per cent of the population of Madison County live in these eight cities having populations of 2,500 or more.

East St. Louis (68,547) is in the northwest corner of St. Clair County, just opposite St. Louis, Missouri (687,029). The transportation facilities of East St. Louis are so excellent that this city no longer serves only as a front door to St. Louis, but it has made rapid

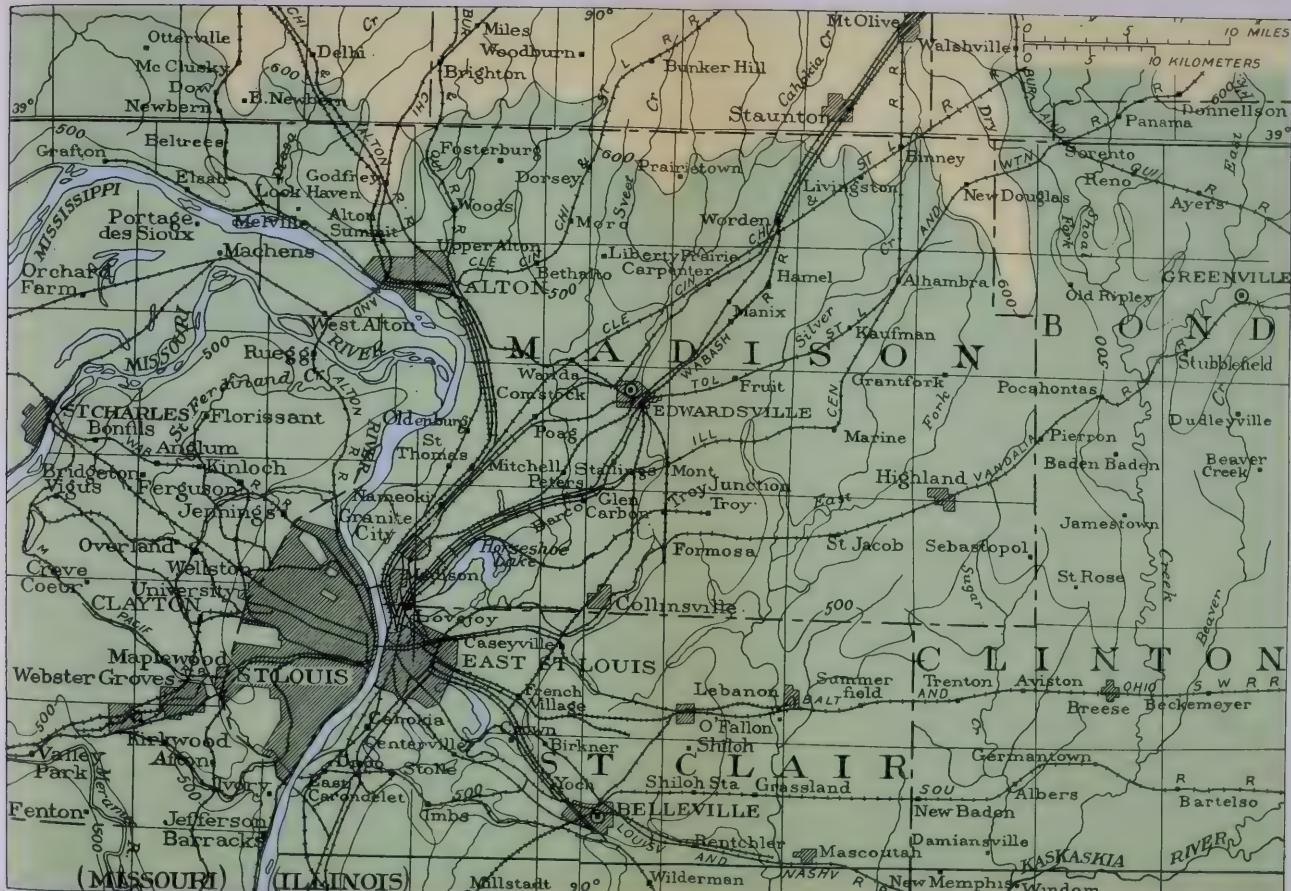


WORK ON THE DIKES, EAST ST. LOUIS

The river floods of 1903 required that the dikes at East St. Louis be quickly raised by means of thousands of bags of sand. Permanent improvements now make the dikes stronger. (Copyright by Keystone View Company.)

progress in developing important industries of its own. It stands second only to Chicago in its importance as a railroad center in Illinois. Its growth since 1910 has been marked. Cahokia Creek joins the Mississippi at East St. Louis.

Belleville (21,122), the county seat of St. Clair County, is located near the divide between the Mississippi and Kaskaskia rivers. It is an important coal-mining and manufacturing center. Scott Aviation Field, at which hundreds of aviators received their training during the world-war, is located at Belleville.



ST. LOUIS, EAST ST. LOUIS, AND VICINITY

This map (scale 1 inch to 8 miles) represents an area 60 miles by 40 miles, the southwest portion of which is in Missouri. The convergence of railroad lines on East St. Louis and St. Louis indicates the control which river courses and suitable river crossings have on transportation lines.



St. Clair County stands next to Cook County in population. Two-thirds of the people of the county live in the two cities of East St. Louis and Belleville. Smaller cities of the county contain more than 10 per cent of the population of the county. The western portions of Madison and St. Clair counties from Alton to Belleville, a distance of 30 miles, form an urban district of the St. Louis region, much as the cities of northeastern Illinois form an urban district in the Chicago region.

Columbia (2,076), and **Waterloo (2,091)**, the county seat, are the principal towns of Monroe County.

Cities of the Kaskaskia Basin.—The Kaskaskia River Basin is nearly 200 miles in length with an average width of about 30 miles. It lies in a northeast-southwest direction, extending from Champaign County to Randolph County, approaching within 40 miles of the Indiana state line. It has an area of 5,710 square miles, or one-tenth of the area of the state. Champaign and Urbana are on the divide between the Kaskaskia and Wabash basins and will be included with the cities of the Wabash Basin.

Sullivan (2,621) is the county seat of Moultrie County, and **Shelbyville (3,590)** of Shelby County.

Pana (6,055), in the southeast corner of Christian County, is an important coal-mining center.

In Montgomery County are found **Nokomis (1,872)**, **Witt (2,170)**, **Hillsboro (3,424)**, the county seat, and **Litchfield (5,971)**. Coal-mining is important at these cities.

Mount Olive (3,501) is in the southeast corner of Macoupin County on the western margin of the Kaskaskia Basin. It lies in the rich coal district, and is only a few miles from Gillespie, Benld, and Staunton.

Vandalia (2,974), the county seat of Fayette County, was the state capital for twenty years, 1819 to 1839. The old capitol is now the county courthouse.

Greenville (3,178) is the county seat of Bond County.

Carlyle (1,982) is the county seat of Clinton County. **Breese (2,128)** is in the same county.

In that portion of St. Clair County included in the Kaskaskia Basin are **O'Fallon (2,018)**, **Lebanon (1,907)**, **Mascoutah (2,081)**, **Millstadt (1,140)**, **New Athens (1,131)**, and **Marissa (2,004)**.

Salem (2,669) is the county seat of Marion County. Near **Odin (1,400)** is found one of the state agricultural experiment fields.

Centralia (9,680), at the western margin of Marion County, is a coal-mining center. It is the most important railroad center and the largest city located within the borders of the Kaskaskia Basin. **Belleville** and **Champaign**, on the edges of the basin, are larger than Centralia.

Nashville (2,135) is the county seat of Washington County.

Sparta (3,081) is the largest city in Randolph County.

Chester (2,747), the county seat of Randolph County, is the seat of the Southern Illinois State Penitentiary and of a state hospital. Chester is located on the Mississippi about 10 miles below the present junction of the Kaskaskia with the Mississippi. Before the cut-off was made forming Kaskaskia Island, the Kaskaskia River joined the Mississippi just above Chester. The Mississippi at present occupies, for a distance of about 10 miles, the former lower course of the Kaskaskia.

Kaskaskia (142), or New Kaskaskia, as it is called to distinguish it from the noted settlement of colonial days, is a village located on Kaskaskia Island. It is an Illinois village located *west* of the Mississippi River.

Cities of the Big Muddy Basin.—The Big Muddy River Basin has an area of 2,230 square miles, or 4 per cent of the area of the state. It contains ten cities having populations of 2,500 or more, and numerous smaller cities and villages. No other part of the state except the urban districts of Chicago and St. Louis has so many cities of more than 2,500 inhabitants in so small an area. None of these ten cities had a population of 10,000 in 1910. The basin contains the most productive coal district of the state, Williamson and Franklin counties alone producing about one-fourth of the output of the state. Coal mines are found near each of the ten cities except Mount Vernon.

Mount Vernon (8,007), the county seat of Jefferson County, was the largest of the cities of the Big Muddy Basin in 1910. It is an important railroad center.

Pinckneyville (2,722) is the county seat and **Duquoin (5,454)** the largest city in Perry County. **Benton (2,675)** is the county seat of Franklin County.

Murphysboro (7,485) is the county seat of Jackson County. **Carbondale (5,411)** is the seat of the Southern Illinois State Normal University.

Johnston City (3,248), **Herrin (6,861)**, **Carterville (2,971)**, and **Marion (7,093)** are in Williamson County, the most important coal-producing county of the state, furnishing about one-sixth of the total for the state. These four cities have 45 per cent of the population of the county. Marion is the county seat.

Cities of the Saline Basin.—The Saline River and its tributaries drain an area of considerable extent lying east of the Big Muddy Basin and north of the Ozark Ridge. The Saline River empties into the Ohio about 15 miles below the mouth of the Wabash.

Harrisburg (5,309), county seat of Saline County, is the largest city of the Saline Basin. **Eldorado (3,366)** is the second city of the county. **Carrier Mills (1,558)** at the foot of the Ozark Ridge has the southernmost coal mines of the state. The coal-bearing rocks are absent from the Ozarks. Saline County ranks high in coal production with twenty or more shipping mines.

Equality (1,180), in Gallatin County, was noted for its salt works in the days of early settlement in Illinois.

Shawneetown (1,863), county seat of Gallatin County, located on the Ohio River, six miles below the mouth of the Wabash, was the leading city of southeastern Illinois in the pioneer days when travel and commerce were largely carried on by river.

Cities of the Ozark region.—The Ozark Plateau and its spurs occupy the southernmost seven counties of Illinois. These seven counties have four cities with populations of 2,500 or more, only one of which is on the Ozark uplands, the other three being ports on the Ohio River.

Jonesboro (1,169) is the county seat of Union County. **Anna (2,809)** is the seat of a state hospital.

Vienna (1,124) is the county seat of Johnson County.

Golconda (1,088), the county seat of Pope County, is located on the Ohio River, and it is the terminus of a railroad branch line. Fluor spar from the mines of Rosiclare is here transferred from the river to the railroad.

Rosiclare (609), in Hardin County, has the largest fluor-spar mines in the world. A railroad about one mile in length brings the fluor spar from the mines to the wharf, where it is loaded on boats and taken downstream to Golconda or upstream to Shawneetown for transshipment by railroad.

Elizabethtown (633), the county seat of Hardin County, is known everywhere throughout southern Illinois as E-town.

Thebes (717), in Alexander County, is at the Illinois end of a railroad bridge, the only Illinois bridge across the Mississippi south of St. Louis.

Cairo (14,548), the county seat of Alexander County, is located at the junction of the Ohio and Mississippi rivers

with its wharves on the Ohio River front. A railroad bridge crosses the Ohio River here. Cairo is the metropolis of southern Illinois. It is the largest city in Illinois south of Belleville, 120 miles away. No city so large as Cairo is found to the north and east until we reach Springfield or



MAIN STREET, ELIZABETHTOWN, HARDIN COUNTY

"E-town" is a county seat and a river port without a railroad. The Ohio River is seen at the foot of Main Street.

Decatur, 200 miles to the north, or Danville, 250 miles to the northeast, in each case more than half the distance from Cairo to Chicago. Cairo has important commercial and manufacturing interests.

Mound City (2,837), the county seat of Pulaski County, is a river port on the Ohio, 7 miles upstream, almost due north from Cairo. It has important lumber industries. **Mounds (1,686)**, 3 miles from Mound City, is an important railroad junction.

Joppa (734), in Massac County, is a river port, a railroad terminus, and an important center for truck farming for northern markets.

Metropolis (4,655), the county seat of Massac County, is an important river port, and the site of a new railroad bridge

across the Ohio, the only one in Illinois above Cairo. The Fort Massac State Park, near which George Rogers Clark entered Illinois, is located at Metropolis. It contains a monument to George Rogers Clark.

Brookport (1,443), six miles up the Ohio from Metropolis, is the terminus of a railroad branch line. Brookport is opposite **Paducah, Kentucky (22,760)**, with which it is connected by a car ferry.

Cities of the Wabash Basin.—The Wabash River Basin in Illinois extends from Ford County on the north to Gallatin County on the south. Its north-south length is about 200 miles and its width varies from 40 to 60 miles. Its area is 8,770 miles, or 15 percent of the area of the state. In this area there are 18 cities having a population of 2,500 or more. The northern part of the basin is drained by the Vermilion River, a tributary which joins the Wabash in Indiana. This stream is sometimes designated as the Wabash-Vermilion to distinguish it from the Illinois-Vermilion, which flows to the northwest and joins the Illinois River in La Salle County.

Paxton (2,912) is the county seat of Ford County.

Rantoul (1,384) is in Champaign County, 15 miles north of Champaign. Shortly after the United States entered the world-war the citizens of Rantoul and vicinity secured the location of an aviation training camp at Rantoul. The camp is known as Chanute Aviation Field. The field occupies



FORT MASSAC AND MONUMENT TO GEORGE ROGERS CLARK, METROPOLIS, MASSAC COUNTY

George Rogers Clark and his company of soldiers carried the first American flag into the Illinois country in 1778, entering Illinois from the Ohio River near this scene.

one square mile of very level land. More than a thousand men were engaged here as mechanics, instructors, and cadets, large classes graduating at frequent intervals and other candidates taking their places.

Champaign (12,421) and **Urbana** (8,245) are adjoining cities, the seat of the University of Illinois. The campus with its numerous buildings is in Urbana, extending along the street which forms the boundary line between the two cities. The two cities form a compact urban area. Urbana was founded earlier than Champaign and before railroads were built. The survey for the Illinois Central Railroad carried the line 2 miles west of Urbana across the open prairie. A settlement was then started at Champaign. The "Big Four" Railroad passes through both cities. All Chicago traffic, however, is carried on through Champaign. Both cities have built good business establishments and excellent residential districts. Champaign has developed the more extensive business district and has the larger population. The two cities furnish homes for 40 per cent of the people of Champaign County. Urbana is the county seat.

Hooperston (4,698), in the northern part of Vermilion County, has important corn-canning factories.

Danville (27,871), the county seat of Vermilion County, is an important coal-mining center. **Westville** (2,607) and **Georgetown** (2,307), south of Danville, have coal mines. These four cities contain 48 per cent of the population of Vermilion County.

Tuscola (2,453), the county seat, and **Arcola** (2,100) are the principal cities of Douglas County.

Mattoon (11,456), the largest city between Cairo and Champaign, is an important railroad center in the western part of Coles County. It is a great broom-corn market, as broom corn is raised extensively in Coles and adjoining counties.

Charleston (5,884), the county seat of Coles County, is the seat of the Eastern Illinois State Normal School.

Paris (7,664), the county seat of Edgar County, is a good railroad center. An electric line connects Paris and Terre Haute, Indiana.

Marshall (2,569), the county seat, and **Casey** (2,157) are the principal cities of Clark County.

Toledo (900), the county seat, **Neoga** (1,074), and **Greenup** (1,224) are the principal towns of Cumberland County.

Effingham (3,898), the county seat of Effingham County, is the seat of a school of photography.

Newton (2,108) is the county seat of Jasper County.

Robinson (3,863), the county seat of Crawford County, is in the oil-producing district. It has an oil refinery and manufactures oil-well supplies. **Oblong** (1,482) is also in the oil region of Crawford County.

Lawrenceville (3,235), the county seat, and **Bridgeport** (2,703) are in the rich oil fields of Lawrence County. Lawrenceville has two oil refineries and an asphalt factory. **Sumner** (1,413) is in the western part of Lawrence County.

Olney (5,011) is the county seat of Lawrence County. "Larchmound," the country home of Robert Ridgway, America's noted ornithologist, and "Bird Haven," a tract of native woodland owned and set aside by Mr. Ridgway as a natural breeding-place for birds, are located near Olney.

Louisville (670) is the county seat and **Flora** (2,704) the largest city of Clay County.

Fairfield (2,479) is the county seat of Wayne County. An agricultural experiment field is located near Fairfield.

Albion (1,281), the county seat of Edwards County, was laid out in October, 1818, in the center of the English settlement which was made under the leadership of George Flower and Morris Birbeck. The settlement was made famous throughout the world through the notes, pamphlets, and letters of the founders and by published reports of foreign travelers who visited the settlement in its early years. These reports stimulated immigration to Illinois from other states and from abroad. The first public library in Illinois was founded at Albion in 1818. The home built by Mr. Flower in 1819 was said to be in its day the finest residence west of the Allegheny Mountains.

Mount Carmel (6,934), the county seat of Wabash County, is the largest city in Illinois located on the Wabash River. A ferry runs between Mount Carmel and the Indiana shore.

Grayville (1,940) is in the northeast corner of White County on the Wabash. **Carmi (2,833)**, the county seat, is near the center of the county.

Growth of Illinois Cities.—In the foregoing chapters no effort has been made to take account of the changes in population of Illinois cities since 1910. From the official figures given in these pages, and a knowledge of local conditions at present, the reader will be able to arrive at correct conclusions concerning increase of population during recent years in his own locality. The larger cities with good commercial locations have grown in population; many of the smaller cities which have secured industrial plants have made important increases in population.

In 1915 the U.S. Census Bureau made careful estimates of the population of the large cities of the United States. The total estimated population of the 38 cities of Illinois having 10,000 or more inhabitants in 1915 was 3,383,407.

The total population of the 112 cities having populations between 2,500 and 10,000 in 1910 was 525,966, or 9 per cent of the population of the state. The total population of the 144 cities having 2,500 or more inhabitants was 3,476,929, or 61 per cent of the population of the state.

A complete list of all villages, cities, and railroad stations includes more than 4,000 names.

In the accompanying tables the 144 cities of Illinois are listed in the order of population in 1910, and 38 are also listed in the order of estimated population in 1915.

Conclusion.—Although Illinois is the leading state in agriculture, there is a notable concentration of the population in cities. The smaller cities serve the commercial needs of the farming communities in which they are located. Others of the smaller and moderate-sized cities are located in coal-mining districts. Other larger cities have profited by the location of large commercial houses and manufacturing plants. Chicago, the metropolis of the state, contains 1.6 times as great a population as the next 143 cities of the state combined. It is Chicago and suburbs that give Illinois the appearance of an urban rather than an agricultural state. Outside the Chicago district the urban population of the state is well developed,

but not predominant for a thriving agricultural and coal-producing state.

TABLE I

CITIES OF ILLINOIS, POPULATION 10,000 OR MORE, 1910 AND 1915

Rank 1910	City	Population 1910	Rank 1915	City	Population 1915
1...	Chicago	2,185,283	1...	Chicago	2,447,045
2...	Peoria	66,950	2...	East St. Louis	72,105
3...	East St. Louis	58,547	3...	Peoria	70,732
4...	Springfield	51,678	4...	Springfield	59,468
5...	Rockford	45,401	5...	Rockford	53,761
6...	Quincy	36,587	6...	Decatur	38,526
7...	Joliet	34,670	7...	Joliet	37,472
8...	Decatur	31,140	8...	Quincy	36,764
9...	Aurora	29,807	9...	Aurora	33,613
10...	Danville	27,871	10...	Danville	31,554
11...	Elgin	25,976	11...	Evanston	28,312
12...	Bloomington	25,768	12...	Rock Island	27,961
13...	Evanston	24,978	13...	Elgin	27,844
14...	Rock Island	24,335	14...	Bloomington	27,054
15...	Moline	24,199	15...	Moline	26,927
16...	Galesburg	22,089	16...	Oak Park	25,492
17...	Belleville	21,122	17...	Galesburg	23,923
18...	Oak Park	19,444	18...	Alton	22,483
19...	Freeport	17,567	19...	Belleville	21,144
20...	Alton	17,528	20...	Chicago Heights	20,626
21...	Waukegan	16,069	21...	Waukegan	19,571
22...	Jacksonville	15,326	22...	Freeport	19,293
23...	Cicero	14,557	23...	Cicero	19,102
24...	Cairo	14,548	24...	Cairo	15,593
25...	Chicago Heights	14,525	25...	Jacksonville	15,456
26...	Streator	14,253	26...	Granite City	14,394
27...	Kankakee	13,986	27...	Streator	14,295
28...	Champaign	12,421	28...	Kankakee	14,190
29...	La Salle	11,537	29...	Champaign	14,171
30...	Mattoon	11,456	30...	Kewanee	13,517
31...	Lincoln	10,892	31...	Canton	12,850
32...	Canton	10,453	32...	Mattoon	12,400
			33...	La Salle	12,110
			34...	Lincoln	11,685
			35...	Centralia	11,238
			36...	Pekin	10,673
			37...	Maywood	10,155
			38...	Monmouth	10,008
Total, 32 cities...		2,950,963	Total, 38 cities....		3,383,407
Percentage of state		52	Total, 32 cities, 1910 list.....		3,313,422
			Increase, 32 cities, 1910 list.....		362,459
			Increase percentage, 32 cities, 1910 list.		12

TABLE II
CITIES OF ILLINOIS, POPULATION 2,500 TO 10,000, 1910

Rank	City	Population	Rank	City	Population
33.	Granite City	9,903	81.	Morris	4,563
34.	Pekin	9,897	82.	Batavia	4,436
35.	Centralia	9,680	83.	Woodstock	4,331
36.	Ottawa	9,535	84.	Highland Park	4,209
37.	Kewanee	9,307	85.	Princeton	4,131
38.	Monmouth	9,128	86.	Jerseyville	4,113
39.	Urbana	8,245	87.	St. Charles	4,046
40.	DeKalb	8,102	88.	Normal	4,024
41.	Blue Island	8,043	89.	Virden	4,000
42.	Maywood	8,033	90.	Sycamore	3,986
43.	Mount Vernon	8,007	91.	Effingham	3,898
44.	Peru	7,984	92.	Robinson	3,863
45.	Paris	7,664	93.	Mendota	3,806
46.	Murphysboro	7,485	94.	Venice	3,718
47.	Collinsville	7,478	95.	Morgan Park	3,694
48.	Sterling	7,467	96.	Savanna	3,691
49.	Belvidere	7,253	97.	Carlinville	3,616
50.	Harvey	7,227	98.	Shelbyville	3,590
51.	Dixon	7,216	99.	Havana	3,525
52.	Marion	7,093	100.	Mount Olive	3,501
53.	Spring Valley	7,035	101.	Naperville	3,449
54.	Mount Carmel	6,934	102.	Hillsboro	3,424
55.	Herrin	6,861	103.	Wheaton	3,423
56.	Forest Park	6,594	104.	Eldorado	3,366
57.	Beardstown	6,107	105.	Lake Forest	3,349
58.	Pontiac	6,090	106.	North Chicago	3,306
59.	Pana	6,055	107.	Marseilles	3,291
60.	Litchfield	5,971	108.	Johnston City	3,248
61.	Charleston	5,884	109.	Lawrenceville	3,235
62.	Berwyn	5,841	110.	Geneseo	3,199
63.	Macomb	5,774	111.	Oglesby	3,194
64.	Duquoin	5,454	112.	Greenville	3,178
65.	Taylorville	5,446	113.	Winnetka	3,168
66.	Carbondale	5,411	114.	Sparta	3,081
67.	Harrisburg	5,309	115.	Harvard	3,008
68.	LaGrange	5,282	116.	Vandalia	2,974
69.	Clinton	5,165	117.	Carterville	2,971
70.	Staunton	5,048	118.	Upper Alton	2,918
71.	Madison	5,046	119.	Paxton	2,912
72.	Edwardsville	5,014	120.	White Hall	2,854
73.	Olney	5,011	121.	Mound City	2,837
74.	West Hammond	4,948	122.	Carmi	2,833
75.	Wilmette	4,943	123.	Anna	2,809
76.	Galena	4,855	124.	Chester	2,747
77.	Melrose Park	4,806	125.	Rochelle	2,732
78.	Zion City	4,789	126.	Pickneyville	2,722
79.	Hooperston	4,698	127.	Flora	2,704
80.	Metropolis	4,658	128.	Bridgeport	2,703

TABLE II—*Continued*
CITIES OF ILLINOIS, POPULATION 2,500 TO 10,000, 1919

Rank	City	Popula-tion	Rank	City	Popula-tion
129	Benton	2,675	137	Bushnell	2,619
130	Highland	2,675	138	Westville	2,607
131	Salem	2,669	139	Downers Grove	2,601
132	Averyville	2,668	140	Petersburg	2,587
133	Coal City	2,667	141	Marshall	2,569
134	East Moline	2,665	142	Sandwich	2,557
135	Rock Falls	2,657	143	Lockport	2,555
136	Sullivan	2,621	144	Fairbury	2,505
<hr/>					
Total, 112 cities, 2,500 to 10,000					525,966
Percentage of state					9
Total, 144 cities over 2,500					3,476,929
Percentage of state					61

CHAPTER XX

GOVERNMENT

The capital city.—Old Kaskaskia was the capital of Illinois Territory 1809–18 and the capital of the state of Illinois 1818–20. Vandalia was the second capital of the state, 1820–39.



STATE CAPITOL, SPRINGFIELD

The capitol was completed in 1888. It is in the form of a Greek cross with porticoes of granite and a dome 361 feet in height.

Springfield has been the capital since that date. The beautiful and commodious State House, or Capitol, was erected between 1867 and 1888. In 1905 the appropriation was made for the Supreme Court Building. In 1917 the State Legislature

provided for the construction of a Centennial Memorial Building to be used by various departments of the state government. The corner stone was laid October 5, 1918, on the centennial of the meeting of the first legislature and the inauguration of the first governor. On the same date the statues of Lincoln and Douglas, erected on the capitol grounds, were dedicated. The Governor's Mansion, the home of the chief executive, is also the property of the state. The State Fair Grounds are located at Springfield. Camp Lincoln, set aside for the training of the National Guard, is near the city.



SUPREME COURT BUILDING, SPRINGFIELD

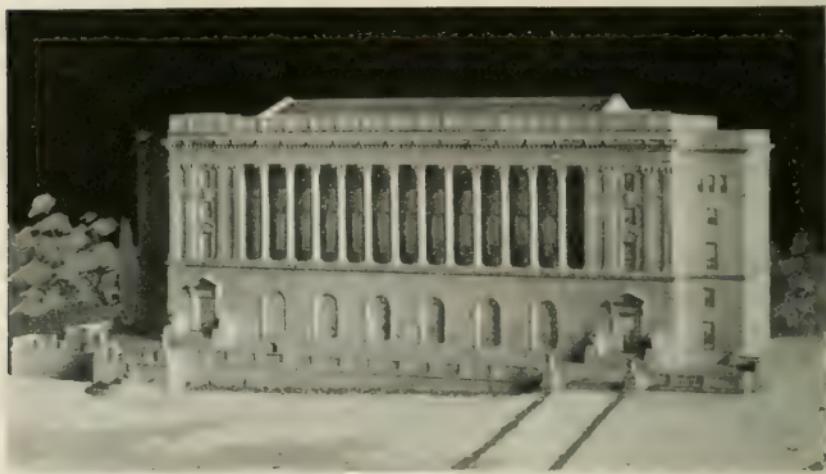
The rapid growth of state business made necessary more room than that contained in the spacious capitol. The Supreme Court Building was the first additional building to be erected for state officials.



GOVERNOR'S MANSION, SPRINGFIELD

The state, like the United States, provides a home for its chief executive during his term of office. The Governor's Mansion is located at Fifth and Jackson streets.

Lincoln's home, now the property of the state, and Lincoln's monument, also under the care of the state, are interesting memorials in the capital city to our most illustrious citizen. The importance of Springfield as a city is largely enhanced by its being the seat of the state government. In addition, the advantages of location due to rich coal fields and fertile agricultural lands, together with excellent transportation facilities and the establishment of numerous industrial and commercial plants, have made Springfield the fourth city of the state in population.



CENTENNIAL BUILDING, SPRINGFIELD

This is a photograph of a model of the Centennial Building. The corner stone was laid October 5, 1918, on the centennial of the meeting of the first legislature and the inauguration of the first governor.



FRENCH MISSION AT LINCOLN'S TOMB, SPRINGFIELD

The French Commission visited Oak Ridge Cemetery on May 7, 1917. Here they are standing beside the tomb of Lincoln. From right to left they are: Marshal Joffre, ex-Premier Viviani, Admiral Chocheprat, and Lieutenant-Colonel Jean Fabry.

State government and geographical divisions.—The state government, like the national government, has three departments, the executive, the legislative, and the judicial. Election of state officers and of United States senators is made by a vote of the state as a whole. The election of persons to the legislative and judicial departments of the state government



LINCOLN CENTENNIAL MONUMENT, EAST ENTRANCE TO CAPITOL GROUNDS, SPRINGFIELD

"Lincoln of the Farewell Address" is the work of the New England sculptor, Andrew O'Connor. This statue was erected in the state centennial year, 1918. It represents Lincoln as he appeared when he left Springfield on February 11, 1861, to go to Washington to take up his new duties as president. The statue is $10\frac{1}{2}$ feet high and stands on a granite base.

and to the Lower House of the Congress of the United States makes necessary the geographical division of the state in several different ways for governmental purposes.

The General Assembly or State Legislature consists of 51 Senators, one for each senatorial district, and 153 Representatives, three for each senatorial district. It is necessary,

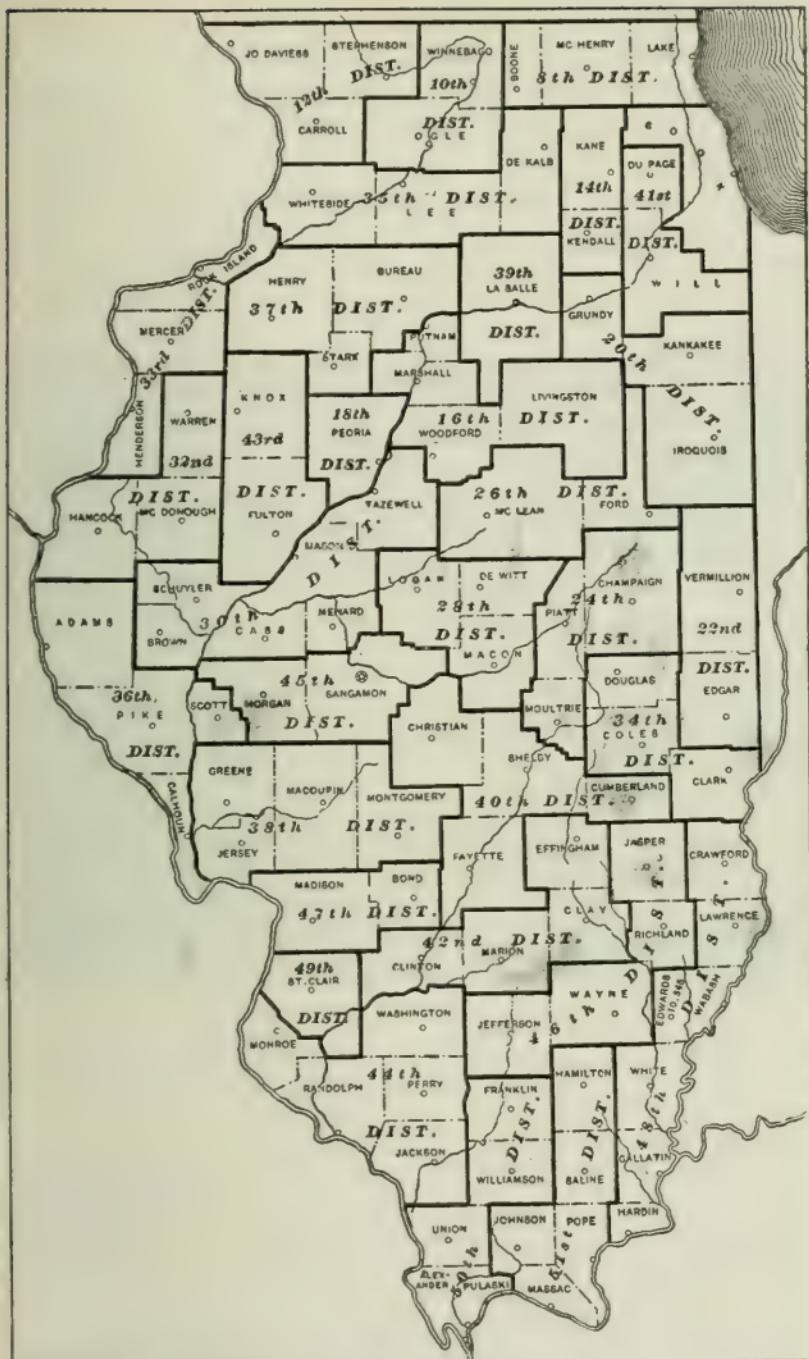
therefore, to divide the state into 51 geographic divisions known and numbered as senatorial districts. These are indicated on the accompanying map. Cook County, because of its large population, contains 19 of the 51 senatorial districts numbered 1, 2, 3, 4, 5, 6, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, and 31. The other districts of the state are numbered on the map. The boundaries of senatorial districts outside of Cook County follow county lines. Each of the three counties, Peoria, La Salle, and St. Clair, forms a district.



STATE ARSENAL AT SPRINGFIELD

This building not only serves its purpose as an arsenal, but it provides a commodious hall for conventions, lectures, and concerts. The State Natural History Museum, now located here, is to be transferred to the Centennial Building when completed.

Other districts are composed of counties varying in number from two to seven. The grouping of counties by districts is shown on the map. The State Legislature meets once in two years at Springfield in the Senate Chamber and the Hall of the House of Representatives of the State Capitol. Joint sessions are held in the Hall of the House of Representatives. The action of the State Legislature applies uniformly to the entire state, but its members, selected from all parts of the state, are expected to keep the Legislature informed



MAP SHOWING SENATORIAL DISTRICTS OF ILLINOIS

concerning the needs of the localities which they represent. The state senators are elected for four years and the representatives for two years.

The state is divided into seven districts for the election of justices of the Supreme Court. The boundaries of these districts follow county lines. The counties composing each district are shown on the accompanying map. The justices

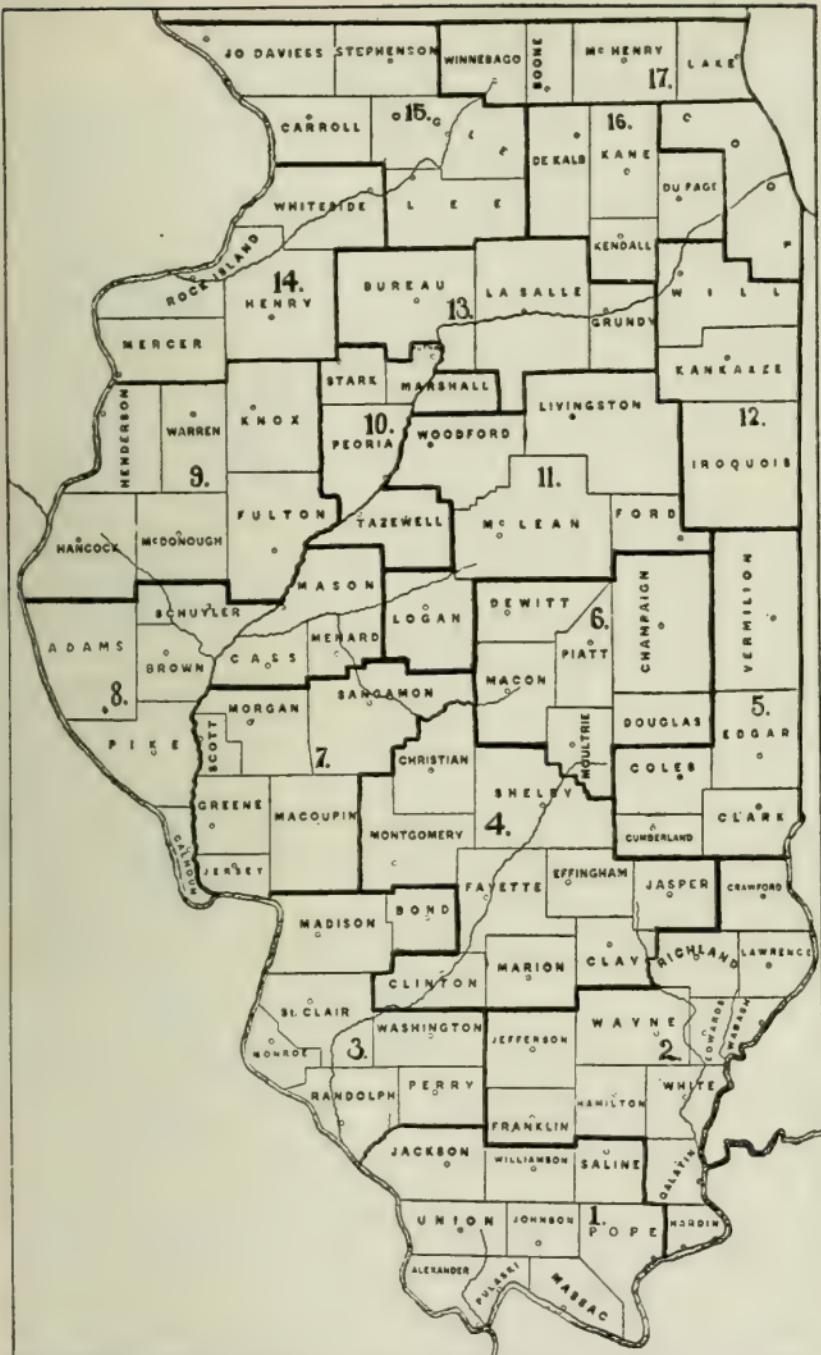


GENERAL ASSEMBLY IN JOINT SESSION

The House of Representatives and the Senate act separately in the passing of laws. The Hall of the House of Representatives is the scene of joint sessions on special occasions.

hold office for nine years. The presiding officer, or chief justice, is selected by the members of the Supreme Court from their own number. He serves as chief justice for one year, and, by rotation, each member serves as chief justice at some time during his term of office.

The state is divided into four Appellate Court Districts as shown on the accompanying map. Justices for these courts are appointed by the Justices of the Supreme Court.



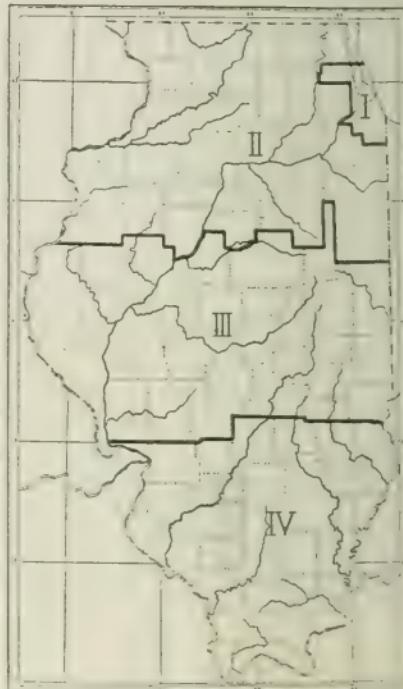
MAP SHOWING JUDICIAL CIRCUITS OF ILLINOIS

The state outside of Cook County is divided into 17 circuits, in each of which three circuit judges are elected for a term of six years. The map on page 321 shows the number and boundaries of the judicial circuits. Special provision is made for the courts of Cook County, and for this reason Cook County does not appear as one of the numbered districts.

Efforts to reapportion the congressional districts of the state based on the census of 1910 have failed. The 25 districts



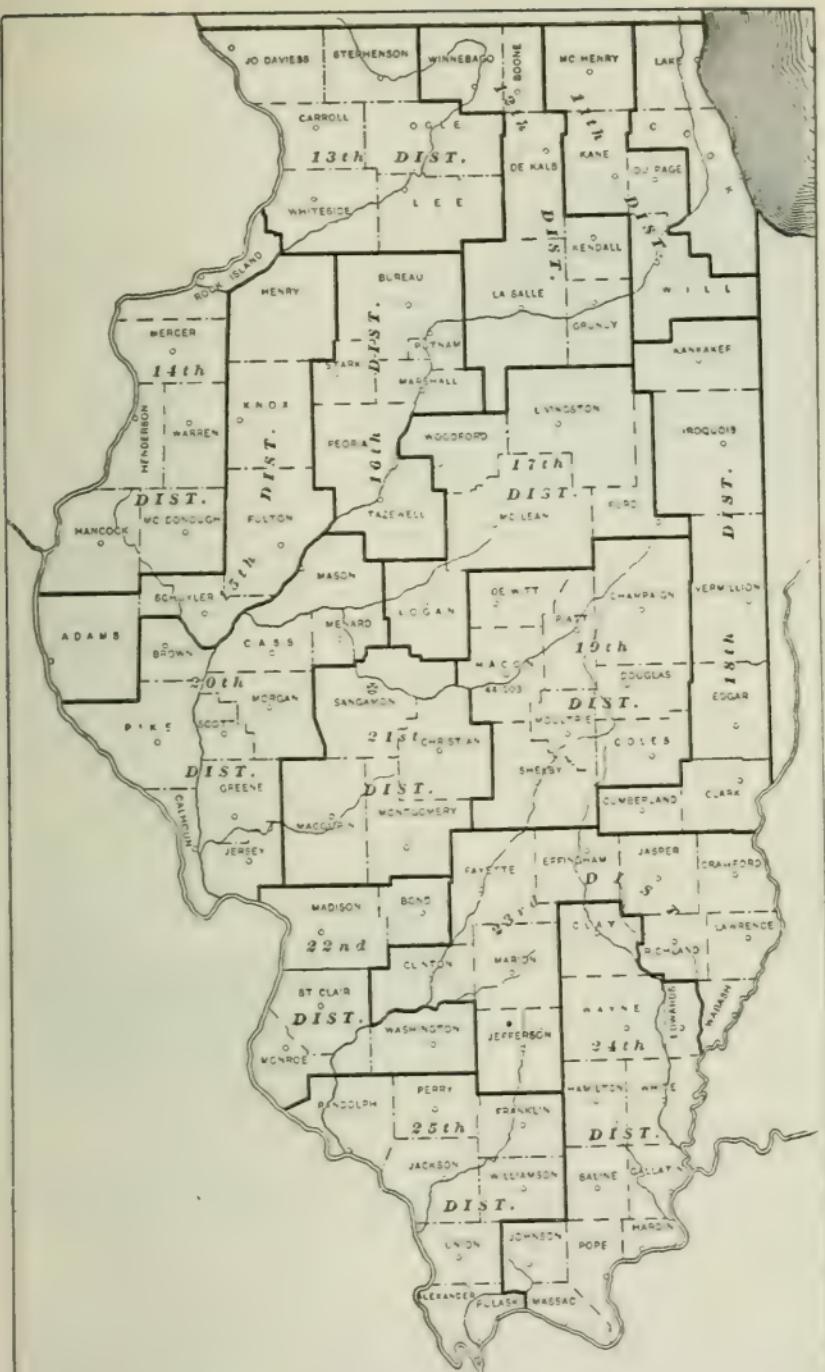
MAP OF THE SUPREME COURT DISTRICTS
OF ILLINOIS



MAP OF APPELLATE COURT DISTRICTS
OF ILLINOIS

The district boundaries follow county lines Cook County alone makes one district

remain, therefore, as apportioned in 1901 based on the census of 1900. Since the census of 1910 gives Illinois 27 representatives in Congress instead of 25, it has been necessary since 1910 to elect two congressmen-at-large. The first nine congressional districts are wholly in Cook County. The tenth district includes the northern part of Cook County and all of



MAP SHOWING CONGRESSIONAL DISTRICTS OF ILLINOIS

Lake County. The other districts follow county lines as indicated on the map shown on page 323. The number of counties in a single district varies from 4 to 11.



SOUTHERN ILLINOIS STATE PENITENTIARY,
CHESTER, RANDOLPH COUNTY

Illinois has two state penitentiaries, one at Joliet and one at Chester. The men are kept busy at some useful labor for which they are fitted.

and Buildings; 6. Public Welfare; 7. Public Health; 8. Trade and Commerce; 9. Registration and Education. A director of each department is appointed by the governor. More than a hundred separate boards and commissions were consolidated under these nine departments.

State institutions.—

There are many things which contribute to the welfare of the people that can be carried on better by the state as a whole than by private or local interests. These

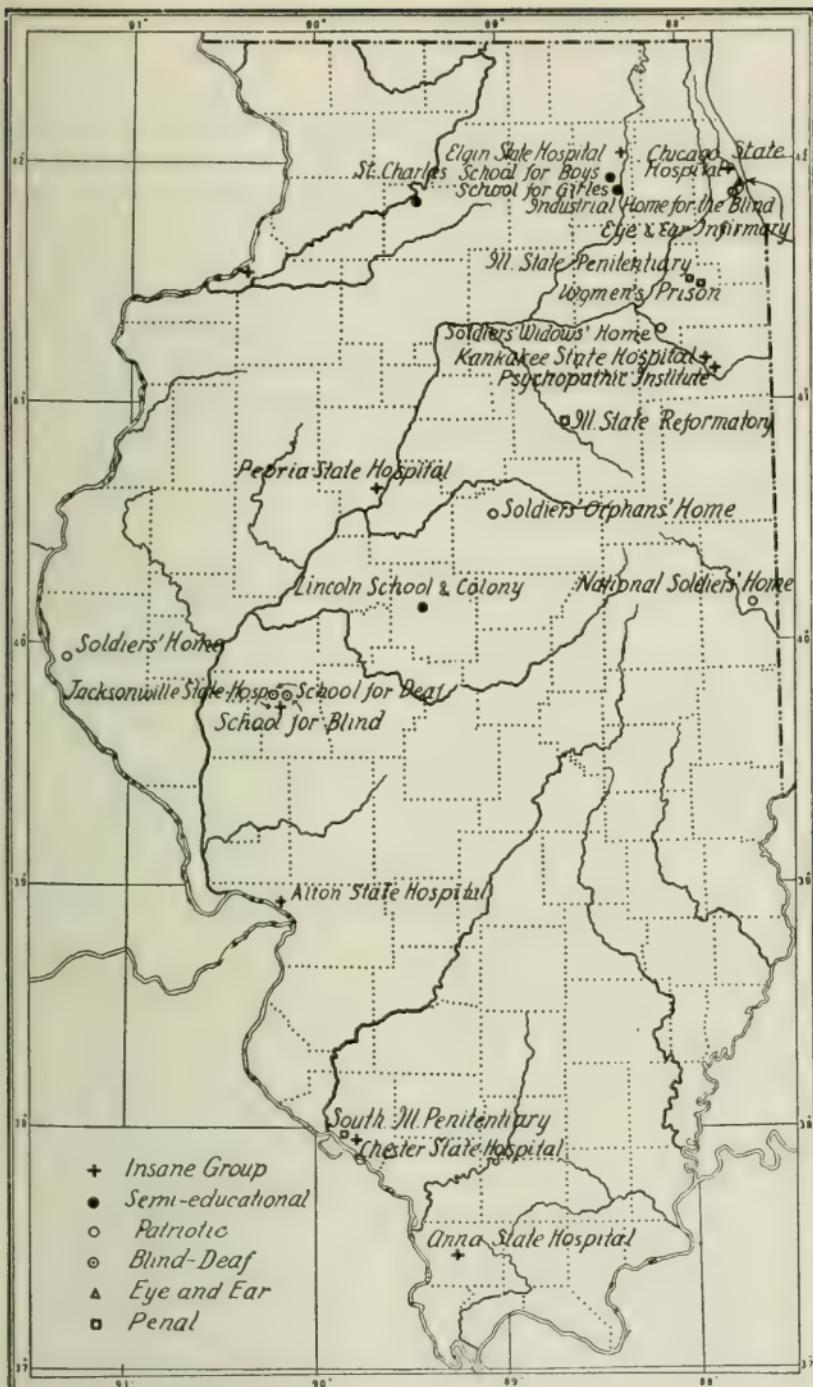
include the state university and the state normal schools as higher institutions of learning; the state hospitals for the care of the insane; schools for boys and girls who are blind, deaf, feeble-minded, or unruly; homes for soldiers, sailors, their

The Administrative Code.—The executive branch of the state government was reorganized on July 1, 1917, under a law known as "The Civil Administrative Code of Illinois." This law provides for nine departments as follows: 1. Finance; 2. Agriculture; 3. Labor; 4. Mines and Minerals; 5. Public Works



STATE REFORMATORY, PONTIAC,
LIVINGSTON COUNTY

Boys who have violated the law are sent to the State Reformatory. Well-organized school work and industrial training prepare them for useful occupations.



MAP OF STATE INSTITUTIONS AND NATIONAL SOLDIERS' HOME

widows, and orphans; and penitentiaries for those who violate the law. Illinois established and supports by general taxation 32 state institutions. The five state normal schools and the state university are listed among the higher institutions of learning of the state, page 325. The 26 other state institutions are given in the accompanying table and their locations are indicated on the map. Number 27 is a national, not a state, institution. Its service, however, is of the same character as that of the State Soldiers' and Sailors' Home at Quincy. It is open to soldiers from any state of the Union. The population of these institutions as given in the table suggests the large service which they render the state.

TABLE I
STATE INSTITUTIONS

No.	Institution	City	Population 1919
1.....	Elgin State Hospital	Elgin	2,144
2.....	Kankakee State Hospital	Kankakee	3,183
3.....	Jacksonville State Hospital	Jacksonville	2,103
4.....	Anna State Hospital	Anna	1,693
5.....	Watertown State Hospital	Watertown	1,603
6.....	Peoria State Hospital	Peoria	2,135
7.....	Chester State Hospital	Chester	142
8.....	Chicago State Hospital	Chicago	3,268
9.....	Alton State Hospital	Alton	702
10.....	Lincoln State School and Colony	Lincoln	2,157
11.....	Dixon Colony for Feeble-Minded	Dixon	.....
12.....	Dixon Colony for Epileptics	Dixon	96
13.....	State Psychopathic Institute	Kankakee	.....
14.....	Illinois School for the Deaf	Jacksonville	346
15.....	Illinois School for the Blind	Jacksonville	213
16.....	Illinois Industrial Home for the Blind	Chicago	80
17.....	Illinois Soldiers' and Sailors' Home	Quincy	1,230
18.....	Soldiers' Widows' Home of Illinois	Wilmington	96
19.....	Soldiers' Orphans' Home	Normal	405
20.....	Illinois Charitable Eye and Ear Infirmary	Chicago	113
21.....	State Training School for Girls	Geneva	453
22.....	St. Charles School for Boys	St. Charles	828
23.....	Illinois State Farm	Lockport	.....
24.....	Illinois State Penitentiary	Joliet	1,483
25.....	Southern Illinois Penitentiary	Chester	1,011
26.....	Illinois State Reformatory	Pontiac	959
27.....	National Soldiers' Home	Danville	1,201

State constitutions.—The first state constitution was adopted in 1818, the second in 1848, and the third in 1870. For several years preceding 1917, various civic organizations of the state had agitated the question of calling a constitutional convention for the purpose of making such changes in the constitution of 1870 as would better meet the present needs of the state. Governor Lowden, in his inaugural message of 1917, submitted the importance of constitutional changes to the General Assembly in the following words:

The time has come for a new state constitution. The constitutions framed since the Civil War, including our own, have not been limited to those things which properly constitute the fundamental law of the state; but have contained many matters which are properly the subject of legislation. Legislation always depends upon existing conditions, and conditions change. A constitution which seems to legislate will inevitably be outgrown. This is our situation today. Therefore, we strongly urge prompt adoption by the General Assembly of a resolution calling for a constitutional convention.

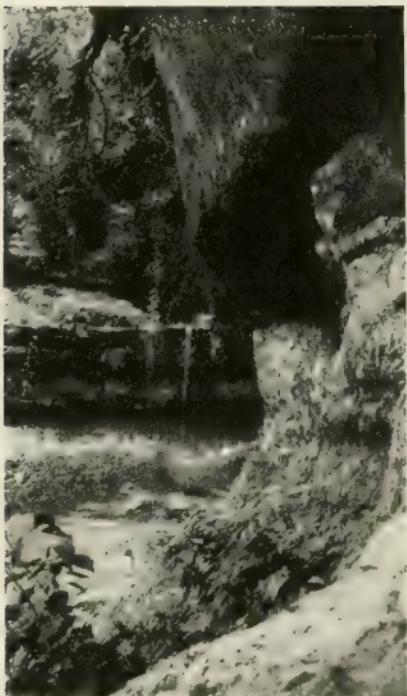
In 1917 the General Assembly adopted a resolution submitting to the voters of the state at the election in November, 1918, the question as to whether or not a convention "to revise, alter, or amend the constitution of this state" should be called. The proposition carried; delegates to a constitutional convention were elected in November, 1919; and the convention assembled in Springfield in January, 1920.

State parks.—The state parks are administered by the Department of Public Works and Buildings through the Division of Parks. The movement to establish a comprehensive system of state parks has taken place since 1900, and a progressive program of action has followed the appointment of a superintendent of parks under the Administrative Code of 1917. The present plan looks forward to the improvement or reclamation of every spot in the state which is of lasting historic importance. The following parks and historic spots are now the property of the state and under the care of the Division of Parks:

1. Starved Rock Park, a tract of about 1,000 acres, is located along the south bank of the Illinois River in La Salle County, near Utica, midway between Ottawa and La Salle. It includes the historic Starved Rock on which La Salle and Tonti erected

Fort St. Louis in 1682. The park extends along the river bluff for 5 miles and includes more than a score of picturesque canyons. French Canyon, Fox Canyon, and Aurora Canyon are among those easily visited and widely known. Starved Rock Park was purchased by the state in 1911. Visitors now number more than 100,000 annually.

A modern hotel, owned by the state, with rooms for 200 guests, offers comfortable accommodations to visitors. Guard rails have been placed in hazardous places, paths have been laid out, and markers put up showing routes to the different canyons. A spacious auditorium is provided for conventions and social gatherings. A garage is also maintained. Admission to the park and its scenery is free to all. The historic associations of the region, the natural beauty of the scenery, the good automobile roads leading to the park, the excellent electric-railway service, the river ferryboats, and the provision made by the state for the comfort of visitors are making of Starved Rock Park one of the most attractive places to



THE FALLS, HEAD OF HORSESHOE CANYON,
STARVED ROCK STATE PARK

Water flows over the falls of the numerous canyons of Starved Rock State Park only in wet weather.

be found between the Appalachian and Rocky mountains.

2. Fort Massac Park is located on the Ohio River at Metropolis in Massac County. George Rogers Clark entered Illinois in 1778 in the immediate vicinity of Fort Massac Park under the first American flag unfurled in Illinois. A monument to George Rogers Clark has been erected in the park. The site of the park, consisting of 25 acres, was

purchased by the state in 1903. Visitors will find here relics of early Illinois history and a magnificent view of the Ohio River and Valley.

3. Fort Chartres Park, 10 acres in area, is located in the northwest corner of Randolph County four miles west of the village of Prairie du Rocher, the nearest railroad station. Recent plans provide for the restoration of the old fortress from the native rock which is abundant in the immediate vicinity. A visit to this early center of the white man's activity in Illinois is well worth the effort of anyone who wishes to reconstruct in imagination the conditions under which early exploration and settlement were made.

4. Shabbona Park, a small plot, $3\frac{1}{2}$ acres, 14 miles north of Ottawa, was secured by the state in 1902. This park and the monument erected in the park commemorate the memory of 15 men, women, and children who were massacred by the Indians in 1832. The park is named for Shabbona, an Indian chief, who rode all night to warn the settlers of their danger. Those who fled at his request saved their lives.

5. Douglas Monument Park, a small plot of ground in Chicago at Thirty-fifth Street and Lake Michigan, is the property of the state and contains a monument to Stephen A. Douglas.

6. The Lincoln Monument in Oak Ridge Cemetery, Springfield, is now state property and under the care of the Division



WATERFALL, WILD CAT CANYON, STARVED ROCK STATE PARK

of Parks. The French and British Commissions which visited the United States shortly after America entered the world-war made pilgrimages to the tomb of Lincoln.

7. The Lincoln Homestead, Eighth and Jackson streets, Springfield, has been donated to the state. Its convenient location makes it possible for people to visit it even if their stay in the capital city is very brief.

8. In 1919 the system of state parks was enlarged by the addition of New Salem Park on the banks of the Sangamon River near Petersburg in Menard County. Abraham Lincoln arrived at the village of New Salem in 1831, at the age of twenty-two. New Salem was Lincoln's home for seven years. Here he kept store, practiced surveying, was chosen captain in the Black Hawk War, studied law, and was elected to the State Legislature. In later years, the village was abandoned, the buildings were removed or decayed, and the exact site of the village and its streets lost to the casual observer. A tract of 60 acres has been donated to the state. Historic buildings of Lincoln's day are to be restored. New Salem Park is one of the most interesting memorials of Abraham Lincoln. President Woodrow Wilson and David Lloyd George, premier of England, were charter members of the Old Salem Lincoln League which created an interest in making New Salem a state park.

9. The General Assembly of 1919 appropriated \$1,500 to provide a marker for the site of Fort Creve Coeur near Peoria. The State Historical Society is engaged in making a thorough investigation concerning the exact site of Creve Coeur. The state marker will not be placed until the committee of the Historical Society reports. Seven sites have been presented for consideration.

Proposed state parks.—Other spots within the state having historic value and scenic beauty are under consideration as desirable additions to the state parks. Among these are the following:

1. The White Pine Forest, a tract of 500 acres in Ogle County, is the only natural white-pine woods in Illinois. As a state park this forest would become a center of attraction to visitors, and its care would furnish an opportunity for practical lessons in scientific forestry.

2. Cahokia Mound or Monk's Mound is in Madison County about 6 miles from East St. Louis. It is a truncated pyramid of earth, 1,080 by 710 feet, and 100 feet above the flood plain of the Mississippi. Sixty smaller mounds are found within a radius of 2 miles. Authorities differ as to whether these mounds are natural or artificial. Regardless of the method of formation, they furnished the native inhabitants of the region good building-sites above flood damage, and the



WHITE-PINE FOREST, OGLE COUNTY

The White Pine Forest, a tract of 500 acres, has been under consideration for many years as a state park. This is the only natural white-pine woods in Illinois.

relics of these former inhabitants are numerous in and near the mounds.

3. Campbell's Island, east of Moline, is a tract of 250 acres now used as an amusement park. Historical interest, however, attaches to the spot from the fact that 16 Americans were killed and 21 wounded here by Indians of Black Hawk's band on July 19, 1814, while an expedition under Major John Campbell was going to the relief of Fort Shelby in Wisconsin.

Internal improvements.—The voters of the state have approved the expenditure of \$20,000,000 for the development

of the Illinois Waterway and \$60,000,000 for the building of good roads. As population has increased and as important needs of value to the state as a whole have appeared, the state government has become increasingly important in its ordinary functions and in the extensive enterprises committed to the state government by special vote of the people.

CHAPTER XXI

EDUCATION

Importance of education.—In order to insure an education to every person of school age the constitution of Illinois states that "the General Assembly shall provide a thorough and efficient system of free schools whereby all children of this state may receive a good common school education." Under this provision the Legislature has established by means of public funds a complete school system from the lowest to the highest grade, comprising elementary schools, high schools, normal schools, and a state university which includes almost every department of general and professional education. More than a million pupils are enrolled in the public schools of Illinois, and one-fifth as many in the private schools. More persons are engaged in Illinois in the one business of getting an education than in any other single industry of the state. The welfare of the state, the nation, and the world depends very largely on the proper conduct of this largest of public enterprises—the education of the rising generation, and the extension of educational opportunities to adults. In addition to the complete system of public education for the children and youth of the state as a whole, special schools have been established at state expense for the best development of those children who cannot take advantage of the ordinary school. These special



AMERICANIZATION EVENING SCHOOL,
SPRINGFIELD

Evening schools for adult foreign-born inhabitants are established in all large cities of the United States. These people are eager to learn the English language and to know more about the resources and government of their adopted country.

schools provide for the education of the blind, the deaf, the feeble-minded, the orphans, and the wayward. Evening schools are maintained in the larger cities of the state where

young people may continue their education and where foreign-born men and women may learn the English language.



TYPICAL COUNTRY SCHOOL, M'LEAN COUNTY

The State Superintendent of Public Instruction has indicated certain conditions for buildings, furnishings, equipment, and instruction whereby country schools may be classified as "standard" and "superior." This is a standard school.

clude four square miles, more or less, of farm lands and employ one teacher; or a larger country district with a consolidated school and several teachers; or the school district may be the corporate limits of a village or small city with one building and few teachers; or a larger city with its numerous school buildings and hundreds of teachers. The city of Chicago constitutes the largest single school district in the state with more than 300 large school buildings and over 8,000 teachers.

Not all the state is included in the high-school districts. The state may therefore be divided into high-school territory and non-high-school territory. Under an insistent public



HIGH SCHOOL, PRINCETON, BUREAU COUNTY

The Princeton Township High School was the first township high school in Illinois.

demand for free public high-school privileges for all boys and girls of the state, and under the operation of a recent law favorable to the development of community high schools, the high-school territory of Illinois is being rapidly extended. The present law provides that pupils living in non-high-school territory may attend a high school and have their tuition paid by the taxpayers of the non-high-school territory of the county. Thus every boy and girl in Illinois may now have a full four-year high-school education without charge for individual tuition.



STATE SOLDIERS' ORPHANS' HOME, NORMAL,
MCLEAN COUNTY

The State Soldiers' Orphans' Home was located in Normal in 1867. At first only the children of deceased soldiers were admitted, but since 1907 the home has been opened to other dependent children.



VIEW AT MILLIKIN UNIVERSITY, DECATUR

The buildings for the James Millikin University were dedicated in 1903.

All children and youth of Illinois are thus given the opportunity of attending schools provided by state action from the first grade to the most extensive and most specialized courses of the state university.

Normal schools.—

Trained teachers are necessary "to provide a thorough and efficient system of free schools," and Illinois has been generous in establishing

five state normal schools in different parts of the state. These normal schools were opened to students in the following



SOUTHERN ILLINOIS STATE NORMAL UNIVERSITY,
CARBONDALE, JACKSON COUNTY

The Southern Illinois State Normal University was opened in 1874.

The Chicago Normal School is maintained by the city of Chicago for the preparation of teachers for the public schools of Chicago.

University of Illinois.—The state university, the University of Illinois, founded in 1867, and located at Urbana, Champaign County, is the highest educational institution of the state. The University is made up of 11 Colleges and Schools, 8 of which are at Urbana and 3 in Chicago. Those at Urbana

order: (1) Illinois State Normal University, Normal, McLean County, 1857; (2) Southern Illinois State Normal University, Carbondale, Jackson County, 1874; (3) Northern Illinois State Normal School, De Kalb, De Kalb County, and (4) Eastern Illinois State Normal School, Charleston, Coles County, both on the same day, September, 1899; and (5) Western Illinois State Normal School, Macomb, McDonough County, 1902.



NORTHERN ILLINOIS STATE NORMAL SCHOOL,
DEKALB, DEKALB COUNTY

The Northern Illinois State Normal School and the Eastern Illinois State Normal School were opened on the same day, September 12, 1899.

are: Liberal Arts and Sciences, Commerce, Education, Engineering, Agriculture, Music, Law, Library; those at Chicago, Medicine, Dentistry, and Pharmacy.

Special schools.—The School for the Deaf and the School for the Blind are at Jacksonville; the Lincoln State School and Colony at Lincoln; the school of the Soldiers' Orphans' Home at Normal; the St. Charles School for Boys at St. Charles; and the State Training School for Girls at Geneva. Each of these schools is established to provide educational opportunities for a special group of pupils who cannot have the



LINCOLN MEMORIAL HALL, UNIVERSITY OF ILLINOIS, URBANA

Lincoln Memorial Hall was made possible by an appropriation given in 1909, the centennial of Lincoln's birth.



WESTERN ILLINOIS STATE NORMAL SCHOOL,
MACOMB, M'DONOUGH COUNTY

Western Illinois State Normal School is the fifth and youngest of the state normal schools of Illinois. It was opened in September, 1902.

advantages of the ordinary public schools. Boys and girls from all parts of the state are sent to these special schools.

Private schools.—About one-fifth as many elementary- and high-school pupils are enrolled in the private schools of the state as in the public schools. These schools may be parochial schools under church management or

tuition schools under individual control. Three-fourths of all pupils of the state attending private schools are in Chicago.

Higher institutions of learning.—In addition to the state normal schools, the Chicago Normal School, and the state



FELL GATE AND BUILDINGS OF THE ILLINOIS STATE NORMAL UNIVERSITY, NORMAL,
M'LEAN COUNTY

The Illinois State Normal University was the first state normal school established in the Mississippi Valley and the ninth in the United States. The Main Building, the one with the clock tower, begun in 1857, is the oldest state normal-school building now in use in the United States.



HARPER LIBRARY AND WOMEN'S HALLS, THE UNIVERSITY OF CHICAGO

Harper Memorial Library was erected in memory of William Rainey Harper, first president of the University of Chicago.

university, which are supported by general taxation, Illinois has numerous other colleges, universities, technical and professional schools supported by funds from other than public revenues. Many of these institutions were founded in the early years of Illinois statehood before the state had assumed the responsibility for the education of the children or the young people of the commonwealth. The table on pages 340-41 indicates the extent to which the higher educational institutions of Illinois are supported and maintained by voluntary action of her citizens. Two of



BLACKBURN COLLEGE, CARLINVILLE, MACOUPIN COUNTY

Blackburn College, founded in 1837 by Rev. Gideon Blackburn, is one of the oldest colleges in Illinois.



BRADLEY INSTITUTE, PEORIA

Bradley Polytechnic Institute was opened in 1897. It is a memorial to the deceased children of Mr. and Mrs. Tobias Bradley.

these institutions, the University of Chicago and Northwestern University, hold high rank among the larger universities of America. Of the 66 institutions of higher learning listed on pages 340-41, 10 are supported by public taxation, and 56 are supported by church or private funds; 28 of these 56 are supported

by 10 different religious denominations, 1 by interdenominational activity, and 27 are either non-sectarian schools or private institutions. Thirty of these 66 institutions are located in Chicago, 2 in Peoria, 2 in Galesburg, 2 in Jacksonville, and 1 in each of 30 other cities, widely distributed throughout the state.

TABLE I
HIGHER INSTITUTIONS OF LEARNING

No.	Institution	Location	Auspices
1.....	University of Illinois	Urbana	State
2.....	State Normal University	Normal	State
3.....	Southern State Normal University	Carbondale	State
4.....	Northern State Normal School	DeKalb	State
5.....	Eastern State Normal School	Charleston	State
6.....	Western State Normal School	Macomb	State
7.....	Chicago Normal School	Chicago	City
8.....	University of Chicago	Chicago	Baptist
9.....	Shurtleff College	Alton	Baptist
10....	Northwestern University	Evanston	Methodist
11....	Illinois Wesleyan University	Bloomington	Methodist
12....	Illinois Woman's College	Jacksonville	Methodist
13....	Hedding College	Abingdon	Methodist
14....	McKendree College	Lebanon	Methodist
15....	Greenville College	Greenville	Free Methodist
16....	Illinois College	Jacksonville	Presbyterian
17....	James Millikin University	Decatur	Presbyterian
18....	Knox College	Galesburg	Presbyterian
19....	Lake Forest College	Lake Forest	Presbyterian
20....	Monmouth College	Monmouth	Presbyterian
21....	Blackburn College	Carlinville	Presbyterian
22....	Lincoln College	Lincoln	Presbyterian
23....	Augustana College	Rock Island	Lutheran
24....	Carthage College	Carthage	Lutheran
25....	Northwestern College	Naperville	Evangelical Lutheran
26....	Eureka College	Eureka	Christian
27....	Mount Morris College	Mount Morris	Dunkard
28....	Aurora College	Aurora	Adventist
29....	De Paul University	Chicago	Roman Catholic
30....	Loyola University	Chicago	Roman Catholic
31....	St. Viator College	Bourbonnais	Roman Catholic
32....	Lombard College	Galesburg	.....
33....	Rockford College	Rockford	.....
34....	Wheaton College	Wheaton	.....
35....	William and Vashti College	Aledo	.....
36....	Armour Institute of Technology	Chicago	.....
37....	Lewis Institute	Chicago	.....
38....	Bradley Polytechnic Institute	Peoria	.....
39....	Joliet Junior College	Joliet	Public School
40....	Frances Shimer School	Mount Carroll	.....
41....	Monticello Seminary	Godfrey	.....
42....	American Conservatory of Music	Chicago	.....
43....	Bush Conservatory of Music	Chicago	.....
44....	Chicago Musical College	Chicago	.....
45....	Columbia School of Music	Chicago	.....

TABLE I—*Continued*

No.	Institution	Location	Auspices
46.....	Cosmopolitan School of Music and Dramatic Art	Chicago	.....
47.....	Sherwood Music School	Chicago	.....
48.....	Technical Normal School	Chicago	.....
49.....	Peoria Musical College	Peoria	.....
50.....	Columbia College of Expression	Chicago	.....
51.....	Art Institute	Chicago	.....
52.....	American College of Physical Education	Chicago	.....
53.....	Chicago Normal School of Physical Education	Chicago	.....
54.....	Young Men's Christian Association College	Chicago	Young Men's Christian Association
55.....	Chicago Kindergarten Institute	Chicago	.....
56.....	National Kindergarten College	Chicago	.....
57.....	Pestalozzi-Froebel Kindergarten Training School	Chicago	.....
58.....	Rush Medical College	Chicago	University of Chicago
59.....	Northwestern University Medical School	Chicago	Northwestern University
60.....	College of Medicine of the University of Illinois	Chicago	University of Illinois
61.....	Hahnemann Medical School	Chicago	.....
62.....	Loyola University College of Medicine	Chicago	Loyola University
63.....	Chicago Medical School	Chicago	.....
64.....	Northwestern University Dental School	Chicago	Northwestern University
65.....	University of Illinois College of Dentistry	Chicago	University of Illinois
66.....	Chicago College of Dental Surgery	Chicago	.....

The establishment of state institutions of higher learning has tended to encourage the progress and development of educational institutions supported by church and private funds. The opportunities for higher education give assurance that Illinois will continue to produce an educated citizenship based upon a system of universal, thorough, and extended education.

Educational statistics.—The magnitude of the schools of Illinois is indicated by the following statistical data from the official report of 1918.

Population of Illinois, census 1910. 5,638,591



MAIN BUILDING OF EASTERN ILLINOIS STATE NORMAL SCHOOL,
CHARLESTON, COLES COUNTY

Eastern Illinois State Normal School was opened September 12, 1899. In addition to the Main Building there are now the Woman's Building, erected in 1909, and the Training School Building, erected in 1913.

ENROLMENT IN PUBLIC SCHOOLS, 1918

		Per Cent
Elementary Schools.....	968,947	89.6
Boys..... 490,762	Girls..... 478,185	
High Schools.....	112,557	10.4
Boys..... 50,107	Girls..... 62,450	
Total, public schools.....	1,081,504	
Boys..... 540,869	Girls..... 540,635	
Enrolled in elementary and secondary private schools	210,000	
Total, all schools.....	1,291,504	

ATTENDANCE AND AVERAGE COST, PUBLIC SCHOOLS

Average number of days schools were in session.....	159
Average number of days each pupil attended.....	141
Average cost per pupil for current expense.....	\$38.38
Average cost per pupil enrolled for all expense.....	\$48.64

DISTRICTS, SCHOOL HOUSES, AND LIBRARIES

Number of districts.....	11,899
Number of school buildings.....	13,725
Number of sittings (capacity).....	1,143,148
Number of libraries.....	11,226
Number of volumes in libraries.....	1,874,831

TEACHERS AND THEIR SALARIES

Number of superintendents, principals, and teachers.	34,597
Men..... 5,600 Women.... 29,997	
Total salaries.....	\$ 27,850,144
Men..... \$ 5,497,985 Women.. \$22,352,159	
Average salaries for all.....	\$805
Men..... \$981 Women.... \$770	
Total current expense.....	\$ 41,507,153
Total expenses for all purposes.....	\$ 52,603,570

VALUE OF SCHOOL PROPERTY

School buildings and sites.....	\$144,086,011
Equipment, furniture, apparatus, etc.....	\$ 10,533,848
Total value all school property.....	\$154,619,859

HIGH SCHOOLS, 1918

Four-year high schools.....	549
Three-year high schools.....	81
Two-year high schools.....	210
Total.....	840
Number of high school teachers.....	5,476
Men..... 2,146 Women.... 2,330	
Number of high school pupils.....	112,557
Number of high school graduates.....	16,071
Four-year schools..... 14,827	
Three-year schools..... 395	
Two-year schools..... 849	
Total current high school expense.....	\$ 8,710,518
Total of all high school expense.....	11,410,270
Average cost per pupil for current expense....	78.07
Average annual salary of high school teachers.....	\$1,159

EVENING SCHOOLS

Enrolment.....	36,976
Boys of school age..... 13,743	
Girls of school age..... 8,525	
Men..... 7,454 Women.... 7,254	
Total expenditures.....	\$290,226

Summary.—The valuable natural resources of Illinois, especially its soil, climate, and minerals, led to rapid settlement and development of the region as knowledge of the Illinois country spread to other states and to foreign lands. In less than a single century Illinois passed from pioneer conditions to a stage of modern progress and civilization equal to that of the foremost countries of the world. Stable government and universal education have made such achievement possible.

CHAPTER XXII

ILLINOIS IN 1920

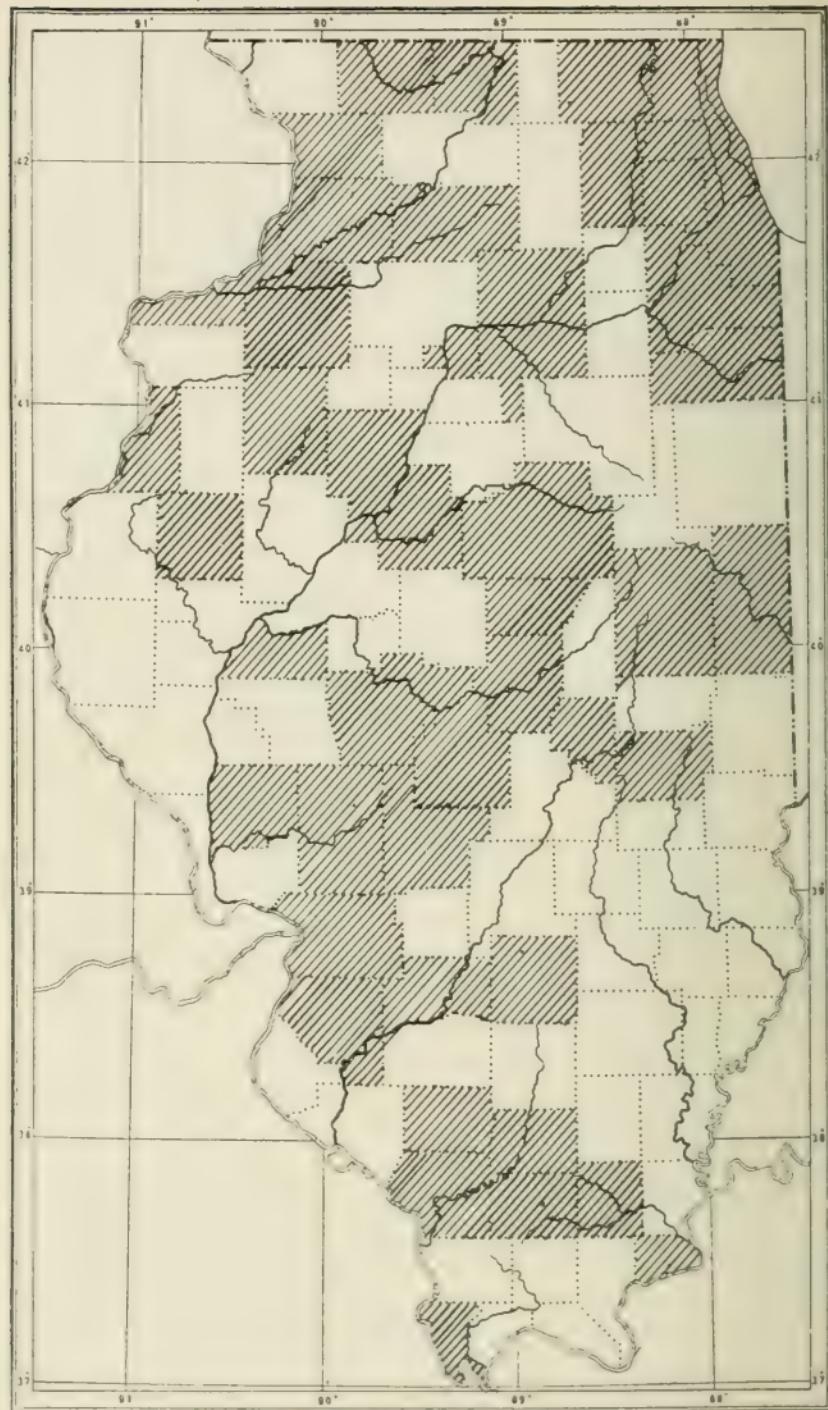
On January 2, 1920, under the direction of the United States Bureau of the Census, thousands of enumerators began the official gathering of data for the Fourteenth Census of the United States.

In January, 1921, the tabulation of population for Illinois was completed. In this chapter the census returns for Illinois are given in full for the 102 counties and the 1,081 incorporated places. The population for Illinois on January 1, 1920, was 6,485,098. This is an increase of 15 per cent over the population for 1910. The population of Continental United States was 105,683,108, and 6.1 per cent of this number resided in Illinois. The population of the United States and of Illinois for all preceding censuses is given in the table on page 147.

Forty-five of the 102 counties increased in population during the past ten years, and 57 decreased in population. The increases varied from 647,784 for Cook County to 18 for Putnam County. The increase for Cook County is 7.65 per cent of the increase for the state. The decrease was greatest for Grundy County, 5,582; and least for Randolph County, 11. Population increases have been due in a very marked degree to increase in the population of cities. Many counties showing decided increase in total population have lost at the same time in rural population. Interesting comparisons may be made from the tables given in this chapter.

The number of incorporated places for 1920 was 1,081, and for 1910, 1,041, an increase during ten years of 40. Fifteen incorporated places of 1910 do not appear in the 1920 list, while 55 new names are found.

Cook County contains the largest number of incorporated places, 75; Bureau County ranks next with 22; and La Salle and Madison counties third, with 21. Each of 6 counties contains 3 incorporated places, the fewest in any county; 8 counties have but 4 incorporated places each; 5 counties have 5 each.



Shaded counties show increase, others decrease, in population, 1910-20

If these 1,081 incorporated places of Illinois are classified on basis of population we find the following:

Inhabitants	No. of Places	Population of the Group	Percentage of State
25,000 or over.....	17	3,072,285	47.3
10,000 to 25,000.....	27	406,080	6.2
5,000 to 10,000.....	47	324,146	4.9
2,500 to 5,000.....	80	264,504	4.0
Total 2,500 or over.....	171	4,067,015	62.4
2,000 to 2,500.....	40	89,616	1.3
1,500 to 2,000.....	51	85,845	1.1
1,000 to 1,500.....	136	166,978	2.5
500 to 1,000.....	265	181,890	2.7
Fewer than 500.....	418	138,984	2.1
Total incorporated places in 1920	1,081	4,730,328	72.1

The census divides the population of the country into two classes: *urban* and *rural*. The urban population includes the population of all cities having 2,500 inhabitants or more; the rural population includes all other persons. A further analysis divides the rural population into two classes: those living in incorporated places having fewer than 2,500 inhabitants and those living on farms in the open country.

The urban population of Illinois constitutes 62.4 per cent of the population of the state, the inhabitants of the smaller incorporated places 9.7 per cent, and those who live in the open country 27.9 per cent.

In 1910, Illinois had 144 cities with a population of 2,500 or over. In 1920, the number had increased to 171. This included all the cities of the 1910 list except 5 whose populations fell below 2,500, and 32 others whose populations passed the 2,500 mark during the ten-year period. In 1920, this group of cities included 4,067,015 inhabitants, or 62.4 per cent of the population of the state. In 1910, the group included 3,476,929 inhabitants, or 61 per cent of the population. Of these 144 cities, 121 have increased in population during the decade, 23 have decreased in population, 5 going below 2,500, the lower limit of the group.

The following tables contain the names of the counties in alphabetical order and the incorporated places in each county, also arranged alphabetically, with population for 1920 and 1910.

There are 5 counties that have a population of over 100,000. 14 between 50,000 and 100,000, 31 between 26,000 and 50,000, and 52 have less than 25,000.

These tables are followed by a final table giving the 171 cities having a population of 1,500 or more in order of rank in population for 1920. This table may be compared with a similar table for 1910 on page 312.

	1920	1910		1920	1910
ILLINOIS . .	6,485,098	5,638,591	Bureau County . .	42,648	43,975
Adams County . .	62,188	64,588	Arlington	284	370
Camp Point . . .	994	1,148	Buda	796	887
Clayton	1,038	940	Bureau	682	534
Coatsburg	185	262	Cherry	1,265	1,048
Columbus	141	134	Dalzell	903	949
Golden	654	579	Depue	2,525	1,339
La Prairie	174	187	Dover	165	181
Lima	213	797	Holloway	107	196
Lorraine	527	417	Ladd	2,040	1,910
Mendon	645	640	Lamoille	547	555
Payson	453	467	Malden	233	255
Plainville	245	251	Manlius	309	218
Quincy	35,978	36,587	Mineral	308	349
Alexander County	23,980	22,741	Neponset	476	542
Cairo	15,203	14,548	Ohio	874	527
Tamms	822	400	Princeton	4,126	4,131
Thebes	857	717	Seatonville	534	1,370
Bond County . . .	16,025	17,075	Sheffield	996	1,009
Greenville	3,071	3,178	Spring Valley . . .	6,493	7,035
Mulberry Grove	725	716	Tiskilwa	915	857
Old Ripley	119	146	Walnut	771	763
Panama	477	313	Wyanet	825	872
Pocahontas	830	749	Calhoun County	8,245	8,610
Smithboro	277	301	Batchtown	273	300
Sorento	942	1,018	Brussels	280	283
Boone County . . .	15,322	15,481	Hamburg	352	335
Belvidere	7,804	7,253	Hardin	694	654
Capron	550	562	Kampserville . . .	428	506
Poplar Grove . . .	314	297	Carroll County . . .	19,345	18,035
Brown County . . .	9,336	10,397	Chadwick	582	527
Mound Station	267	194	Lanark	1,297	1,175
Mount Sterling	1,932	1,986	Milledgeville . . .	746	630
Ripley	193	234	Mount Carroll	1,806	1,759
Versailles	627	557	Savanna	5,237	3,691
			Shannon	636	633
			Thompson	495	487

	1920	1910		1920	1910
Cass County	17,896	17,372	Clinton County	22,947	22,832
Arenzville	479	518	Aviston	389	397
Ashland	1,122	1,096	Bartelson	246	344
Beardstown	7,111	6,017	Beckemeyer	1,153	764
Chandlerville	909	884	Bresse	2,399	2,128
Virginia	1,501	1,501	Carlyle	2,027	1,982
Champaign			Germantown	766	711
County	56,959	51,829	Huey	154	205
Broadlands	384	480	Keyesport	288	350
Champaign	15,873	12,421	New Baden	1,550	1,372
Fisher	747	850	New		
Homer	978	1,086	Memphis	252	243
Ivesdale	387	429	Trenton	1,200	1,694
Longview	273	257	Coles County	35,108	34,517
Ludlow	343	305	Ashmore	548	511
Mahomet	649	565	Charleston	6,615	5,884
Ogden	448	428	Humboldt	343	356
Pesotum	478	376	Lerna	677	391
Philo	544	562	Mattoon	13,552	11,456
Rantoul	1,551	1,384	Oakland	1,210	1,159
Sadorus	413	336	Cook		
St. Joseph	772	681	County	3,053,017	2,405,233
Sidney	546	481	Arlington		
Thomasboro	261	321	Heights	2,250	1,943
Tolono	693	760	Barrington	1,744	1,444
Urbana	10,244	8,245	Bartlett	371	408
Christian			Bellwood	1,881	943
County	38,458	34,594	Berwyn	14,150	5,841
Assumption	1,852	1,918	Blue Island	11,424	8,043
Bulpitt	470		Broadview	430	
Edinburg	823	918	Brookfield	3,589	2,186
Humphreys	913		Burnham	795	328
Jerseyville	428		Burr Oak	1,237	
Kincaid	1,453		Chicago	2,701,705	2,185,283
Morrisonville	1,178	1,126	Chicago		
Mount			Heights	19,653	14,525
Auburn	492	463	Chicago		
Owaneco	334	365	Ridge	176	
Palmer	312	404	Cicero	44,995	14,557
Pana	6,122	6,055	Des Plaines	4,640	2,348
Stonington	1,466	1,118	Dolton	2,076	1,869
Taylorville	5,806	5,446	East Hazel		
Clark County	21,165	23,517	Crest	394	
Casey	2,189	2,157	Elmwood		
Marshall	2,222	2,569	Park	1,380	
Martinsville	1,437	1,500	Evanston	37,234	24,978
Westfield	933	927	Evergreen		
Clay County	17,684	18,661	Park	705	424
Clay City	648	837	Forest Park	10,768	6,594
Flora	3,558	2,704	Franklin Park	914	683
Iola	279		Glencoe	3,381	1,899
Louisville	797	670	Glenview	760	652
Sailor Springs	284	388	Glenwood	738	581
Xenia	640	634	Harvey	9,216	7,227

	1920	1910		1920	1910
Hazel Crest..	438	...	Wilmette....	7,814	4,943
Hillside.....	555	328	Winnetka....	6,694	3,168
Hodgkins....	266	480	Worth.....	240	...
Homewood..	1,389	713	Crawford County....	22,771	26,281
Justice.....	183	...	Flat Rock...	745	840
Kenilworth..	1,188	881	Hutsonville..	665	722
LaGrange....	6,525	5,282	Oblong.....	1,547	1,482
LaGrange Park.....	1,684	1,131	Palestine....	1,803	1,399
Lansing.....	1,409	1,060	Robinson....	3,368	3,863
Lemont.....	2,322	2,284	Stoy.....	249	488
Lyons.....	2,564	1,483	Cumberland County....	12,858	14,281
Matteson....	485	431	Greenup.....	1,230	1,224
Maywood ..	12,072	8,033	Jewett.....	243	366
Melrose Park.	7,147	4,806	Neoga.....	1,149	1,074
Morton Grove.....	1,079	836	Toledo.....	787	900
Mount Greenwood	1,441	276	DeKalb County....	31,339	33,457
Mount Prospect...	349	...	Cortland....	238	207
Niles.....	1,258	569	DeKalb.....	7,871	8,102
Niles Center.	763	568	Genoa.....	1,228	1,257
Oak Lawn...	489	287	Hinckley....	665	661
Oak Park....	39,858	19,444	Kingston....	235	294
Orland Park.	343	369	Kirkland....	559	685
Phoenix.....	1,933	679	Malta.....	391	450
Palatine....	1,210	1,144	Sandwich....	2,409	2,557
Palos Park...	240	...	Shabbona....	735	594
Park Ridge..	3,383	2,009	Somonauk...	540	591
Posen.....	947	343	Sycamore....	3,602	3,986
Riverdale....	1,166	917	Waterman...	401	398
River Forest.	4,358	2,456	Dewitt County....	19,352	18,906
River Grove..	484	418	Clinton.....	5,898	5,165
Riverside....	2,532	1,702	Dewitt.....	263	220
Riverview...	334	312	Farmer City..	1,778	1,603
Robbins....	431	...	Kenny.....	504	570
Schiller Park.	390	...	Wapella....	528	498
Shermerville.	554	441	Waynesville..	592	546
South Chicago Heights...	949	552	Weldon.....	573	521
South Holland...	1,247	1,065	Douglas County....	19,553	19,591
Spring Forest	134	334	Arcola.....	1,780	2,100
Stickney....	550	...	Camargo....	336	323
Summit....	4,019	949	Garrett.....	270	290
Tessville....	355	359	Hindsboro...	463	498
Thornton....	767	1,030	Newman....	1,225	1,264
Tinley Park..	493	309	Tuscola....	2,564	2,453
West Hammond.	7,492	4,948	Villa Grove..	2,493	1,828
Western Springs....	1,258	905	Dupage County....	42,096	33,432
Wheeling....	313	260	Addison....	510	579
			Bensonville..	650	443
			Bloomingdale	149	462

	1920	1910		1920	1910
Downers Grove.....	3,543	2,601	Piper City....	715	663
Elmhurst.....	4,594	2,360	Roberts.....	444	466
Glenellyn.....	2,851	1,763	Sibley.....	383	385
Hinsdale.....	4,513	2,451	Franklin County....	57,293	25,943
Itasca.....	339	333	Benton.....	7,201	2,675
Lombard.....	1,331	883	Buckner.....	1,827	...
Naperville... .	3,830	3,449	Christopher..	3,830	1,825
Villa Park....	854	...	Ewing.....	341	317
West Chicago	2,594	2,378	Frankfort Heights....	3,423	...
Wheaton....	4,137	3,423	Hanaford....	1,083	...
Edgar County.....	25,769	27,336	North City....	1,362	...
Brocton.....	562	558	Orient City..	1,388	...
Chrisman.....	1,101	1,193	Royalton....	2,043	357
Hume.....	609	572	Sesser.....	2,841	1,292
Kansas.....	944	945	Thompson-ville....	577	573
Metcalf.....	413	449	Urbain.....	263	...
Paris.....	7,985	7,664	Valier.....	876	...
Redmon.....	234	240	West City....	525	...
Vermilion....	291	287	West Frankfort..	8,478	2,111
Edwards County....	9,431	10,049	Zeigler.....	2,338	...
Albion.....	1,584	1,281	Fulton County.....	48,163	49,549
Bone Gap.....	455	517	Astoria.....	1,340	1,357
Browns.....	388	419	Avon.....	877	865
West Salem.. .	946	725	Bryant.....	482	237
Effingham County....	19,572	20,055	Canton.....	10,928	10,453
Altamont....	1,352	1,328	Cuba.....	1,484	2,019
Beecher City.	328	355	Dieterich.....	493	218
Dieterich....	522	493	Edgewood....	419	482
Edgewood....	438	419	Effingham....	3,898	652
Mason.....	324	345	Montrose....	347	2,312
Montrose....	334	347	Shumway....	269	London Mills
Teutopolis....	744	592	Watson....	316	546
Watson....	316	330	Farina.....	701	555
Fayette County....	26,187	28,075	Ramsey....	772	329
Bingham....	192	191	St. Elmo....	1,337	560
Brownstone.. .	518	415	St. Peter....	396	389
Vandalia....	3,316	2,974	Ford County.....	16,466	915
Cabery.....	299	321	Cabery....	299	Table Grove.
Elliott.....	344	371	Gibson....	2,234	610
Gibson....	2,234	2,086	Gibson....	2,234	Vermont....
Kempton....	266	269	Kempton....	266	1,107
Melvin....	540	509	Melvin....	540	Gallatin County....
Paxton.....	3,033	2,912	Paxton....	3,033	12,856
					14,628
					Equality....
					1,332
					1,180
					Junction....
					321
					New Haven.. .
					570
					Omaha....
					449
					586
					Ridgway....
					1,102
					Shawnee....
					1,368
					Greene County.....
					22,883
					Carrollton... .
					2,020
					Eldred....
					298
					Greenfield....
					1,149
					Hillview....
					577
					309

	1920	1910		1920	1910
Kane.....	473	521	Gladstone...	450	385
Rockbridge..	225	275	Lomax.....	211	...
Roodhouse...	2,928	2,171	Media.....	170	226
White Hall...	2,954	2,854	Oquawka...	888	907
Wilmington..	228	204	Stronghurst..	836	762
Grundy County	18,580	24,162	Henry County..	45,162	41,736
Braceville..	303	971	Alpha.....	281	358
Carbon Hill..	281	820	Andover....	281	222
Central City.	56	287	Annawan...	429	398
Coal City....	1,744	2,667	Atkinson...	778	805
Diamond....	85	255	Bishop Hill..	274	289
East			Cambridge...	1,335	1,272
Brooklyn..	204	446	Colona.....	211	217
Eileen.....	342	677	Galva.....	2,974	2,498
Gardner.....	937	946	Geneseo.....	3,375	3,199
Kinsman....	167	219	Hooppole...	381	...
Mazon.....	442	471	Kewanee....	16,026	9,307
Minooka....	314	361	Orion.....	613	655
Morris.....	4,505	4,563	Wethersfield	1,960	1,593
South Wil-			Woodhull....	700	692
mington...	1,362	2,403	Iroquois		
Verona.....	184	188	County....	34,841	35,543
Hamilton			Ashkum.....	375	416
County....	15,920	18,227	Beavererville..	402	401
Belle Prairie.	178	87	Buckley.....	461	495
Broughton...	506	470	Chebanse...	541	590
Dahlgren....	693	654	Cissna Park..	670	652
McLeansboro	1,927	1,796	Clifton.....	638	634
Hancock			Crescent City	†	341
County....	28,523	30,638	Danforth....	398	410
Augusta.....	1,085	1,146	Donovan....	410	346
Basco.....	267	255	Gilman.....	1,448	1,305
Bentley.....	136	89	Iroquois....	276	286
Bowen.....	715	606	L'Eramble...	101	145
Carthage....	2,129	2,373	Loda.....	530	603
Dallas.....	1,140	1,288	Martinton...	250	312
Elvaston....	†	250	Milford....	1,466	1,316
Ferris.....	†	299	Onarga.....	1,302	1,273
Hamilton....	1,698	1,627	Papineau....	176	183
La Harpe....	1,323	1,349	Sheldon....	1,182	1,143
Nauvoo....	972	1,020	Thawville...	318	318
Plymouth....	900	829	Watseka....	2,817	2,476
Pontoosuc...	199	285	Woodland...	398	295
Warsaw....	2,031	2,254	Jackson		
West Point..	303	292	County....	37,091	35,143
Hardin County.	7,533	7,015	Ava.....	626	780
Cave in Rock	349	306	Campbell Hill	366	414
Elizabeth-			Carbondale..	6,267	5,411
town.....	1,055	633	De Soto....	703	644
Rosiclare....	1,522	609	Elkville....	990	732
Henderson			Fordyce....	463	392
County....	9,770	9,724	Grand Tower	750	873
Biggsville....	325	400	Makanda....	310	400

† Not returned separately.

	1920	1910		1920	1910
Murphysboro	10,703	7,485	East Dundee	1,303	1,405
Vergennes	305	342	Elburn	571	613
Jasper County	16,064	18,157	Elgin	27,454	25,976
Hidalgo	193	190	Geneva	2,803	2,451
Hunt City	195	235	Gilberts	152	268
Newton City	2,083	2,108	Hampshire	618	697
Rose Hill	202	229	Maple Park	384	389
Ste. Marie	351	450	Montgomery	463	371
Wheeler	214	255	North		
Willow Hill	397	444	Aurora	†	352
Jefferson County	28,480	29,111	Pingree		
Belle Rive	311	312	Grove	115	135
Ina	398	484	St. Charles	4,099	4,046
Mount Vernon	9,815	8,007	South Elgin	559	580
Rome	216	233	West Dundee	1,587	1,380
Waltonville	421	..	Kankakee County	44,930	40,752
Woodlawn	309	315	Bonfield	126	162
Jersey County	12,682	13,954	Bourbonnais	620	611
Elsah	167	267	Bradley	2,128	1,942
Fidelity	155	211	Buckingham	165	272
Fieldon	248	227	Clark City	14	230
Grafton	949	1,116	Essex	278	342
Jerseyville	3,839	4,113	Grant Park	459	692
Otterville	150	179	Herscher	449	461
Jo Daviess County	21,917	22,657	Irwin	102	74
Apple River	484	581	Kankakee	16,721	13,986
East Dubuque	1,163	1,253	Manteno	1,182	1,229
Elizabeth	687	703	Momence	2,218	2,201
Galena	4,742	4,855	Reddick	239	288
Hanover	737	650	St. Anne	1,067	1,065
Nora	213	251	Waldron	..	261
Scales Mound	356	388	Kendall County	10,074	10,777
Stockton	1,449	1,096	Bristol	415	394
Warren	1,253	1,331	Lisbon	†	197
Johnson County	12,022	14,331	Millington	212	223
Belknap	424	404	Newark	391	406
Buncombe	280	..	Oswego	676	600
Cypress	438	311	Plano	1,473	1,627
Goreville	581	554	Yorkville	441	431
New Burnside	309	369	Knox County	46,678	46,159
Simpson	178	161	Abingdon	2,721	2,464
Vienna	907	1,124	Altona	506	528
Kane County	99,499	91,862	East Galesburg	566	753
Aurora	36,397	29,807	Galesburg	23,785	22,089
Batavia	4,395	4,436	Henderson	156	171
Burlington	209	282	Knoxville	1,708	1,818
Carpentersville	1,036	1,128	Maquon	441	472

† Not returned separately.

	1920	1910		1920	1910
Wataga....	459	444	Lawrenceville	5,080	3,235
Williamsfield.	435	480	Russellville..	200	257
Yates City....	582	586	St. Francis-		
Lake County... 73,991	55,058		ville.....	1,164	1,391
Antioch....	775	682	Sumner.....	1,029	1,413
Area.....	469	358	Lee County....	28,004	27,750
Deerfield....	610	476	Amboy.....	1,944	1,749
Fox Lake....	467	400	Ashton.....	882	779
Hainesville....	84	66	Compton.....	283	387
Highland			Dixon.....	8,191	7,216
Park.....	6,167	4,209	Franklin		
Highwood....	1,446	1,219	Grove.....	589	572
Lake Bluff....	819	726	Harmon.....	202	162
Lake Forest... 3,363	3,349		Lee.....	289	303
Lake Villa....	407	342	Pawpaw.....	665	709
Lake Zurich....	316	304	Steward.....	253	353
Libertyville.. 2,125	1,724		Sublette.....	262	287
North			West		
Chicago....	5,839	3,306	Brooklyn..	190	266
Round Lake....	251	182	Livingston		
Wauconda....	399	368	County....	39,070	40,465
Waukegan... 19,226	16,069		Campus.....	228	241
Winthrop			Cardiff.....	152	1,031
Harbor....	473	439	Chatsworth..	1,087	1,112
Zion City....	5,580	4,789	Cornell.....	528	536
La Salle			Cullom.....	631	579
County....	92,925	90,132	Dwight.....	2,273	2,156
Cedar Point..	686	545	Emington....	175	190
Crotty.....	994	1,005	Fairbury....	2,532	2,505
Dana.....	251	254	Flanagan....	637	590
Earlville....	1,012	1,059	Forrest.....	965	967
East Wenona	333	367	Long Point..	247	239
Grand Ridge.	389	403	Odell.....	1,069	1,035
Kengley....	261	380	Pontiac....	6,664	6,090
La Salle.... 13,050	11,537		Saunemin....	360	357
Leland.....	588	545	Strawn.....	248	277
Leonore....	189	203	Logan County..	29,562	30,216
Lostant....	911	458	Atlanta.....	1,173	1,367
Marseilles....	3,391	3,291	Broadwell....	209	246
Mendota....	3,934	3,806	Elkhart.....	457	418
North Utica..	1,037	976	Emden.....	816	411
Oglesby....	4,135	3,194	Hartsburg....	332	350
Ottawa....	10,816	9,535	Latham.....	444	438
Peru.....	8,869	7,984	Lincoln....	11,882	10,892
Ransom....	402	370	Middleton...	587	751
Rutland....	618	754	Mount		
Sheridan....	476	506	Pulaski....	1,510	1,511
Streator.... 14,779	14,253		New Holland.	457	387
Tonica....	439	483	McDonough		
Troy Grove.. 261	289		County....	27,074	26,887
Lawrence			Bardolph....	352	285
County....	21,380	22,661	Blandinsville.	1,002	987
Birds.....	290	382	Bushnell....	2,716	2,619
Bridgeport.. 2,229	2,703		Colchester...	1,387	1,445

	1920	1910		1920	1910
Good Hope..	353	361	Bunker Hill..	977	1,046
Industry....	604	580	Carlinville..	5,212	3,616
Macomb....	6,714	5,774	Chesterfield..	363	364
Prairie City..	638	719	Dorchester...	179	102
Sciota.....	195	160	Gillespie.....	4,063	2,241
Tennessee..	252	274	Girard.....	2,387	1,891
McHenry			Hettick.....	298	306
County....	33,164	32,509	Medora.....	483	444
Algonquin..	693	642	Modesto.....	379	298
Cary.....	†	679	Mount Olive.	3,503	3,501
Crystal Lake.	2,249	1,242	Nilwood.....	449	401
Harvard....	3,294	3,008	Palmyra.....	1,331	873
Hebron.....	631	644	Sawyerville..	588	445
Huntley....	720	773	Scottsville..	285	301
Marengo....	1,758	1,936	Shipman.....	333	392
McHenry....	1,146	1,031	Staunton....	6,027	5,048
Richmond..	533	554	Virden.....	4,682	4,000
Spring Grove.	363	203	White City..	503	421
Union.....	399	432	Woodburn..	133	175
Woodstock..	5,523	4,331	Madison		
County....	70,107	68,008	County...	106,895	89,847
Arrowsmith..	344	366	Alhambra...	354	433
Bellflower..	441	394	Alton.....	24,682	17,528
Bloomington.	28,725	25,768	Bethalto....	471	447
Chenoa....	1,311	1,314	Collinsville..	9,753	7,478
Cooksville..	297	332	East Alton...	1,669	584
Colfax.....	976	965	Edwardsville.	5,336	5,014
Danvers....	616	593	Fostersburg..	70	90
Downs.....	295	...	Glen Carbon .	1,323	1,220
Dudson....	309	375	Granite.....	14,757	9,903
Gridley....	720	750	Highland....	2,902	2,675
Heyworth....	851	681	Livingston...	1,365	1,092
Le Roy.....	1,680	1,702	Madison....	4,996	5,046
Lexington..	1,301	1,318	Marine.....	676	685
McLean....	697	707	Maryville....	836	729
Normal....	5,143	4,024	Nameoki....	1,181	...
Saybrook....	752	805	New Douglas	390	499
Stanford....	500	525	Saline.....	222	112
Towanda....	404	404	St. Jacob....	485	534
Macon County.	65,175	54,186	Troy.....	1,312	1,447
Argenta....	528	519	Venice.....	3,895	3,718
Blue Mound.	881	900	Williamson..	805	648
Decatur....	43,818	31,140	Woodriver ..	3,476	84
Macon.....	788	683	Worden.....	1,252	1,082
Maroa....	1,193	1,160	M Marion County.	37,497	35,094
Mount Zion..	330	330	Alma.....	366	380
Niantic....	613	685	Central City.	1,248	1,179
Warrensburg.	490	504	Centralia....	12,491	9,680
Macoupin			Glenridge....	457	...
County....	57,274	50,685	Iuka.....	435	364
Benld.....	3,316	1,912	Kinmundy...	898	997
Brighton....	586	595	Odin.....	1,385	1,400
			Patoka.....	508	676

† Not returned separately.

	1920	1910		1920	1910
Salem.....	3,457	2,669	Valmeyer....	406	...
Sandoval....	1,768	1,563	Waterloo....	1,930	2,091
Vernon.....	230	333	Montgomery		
Wamac.....	1,180	...	County....	41,403	35,311
Marshall			Butler.....	†	233
County....	14,760	15,679	Coalton.....	991	...
Henry.....	1,637	1,687	Colleen.....	945	980
Lacon.....	1,464	1,495	Donnellson..	403	405
La Rose.....	171	155	Farmersville.	513	533
Sparland....	437	461	Fillmore....	511	499
Toluca.....	2,503	2,407	Harvel.....	351	396
Varna.....	359	406	Hillsboro....	5,074	3,424
Wenona.....	1,203	1,442	Irving.....	519	678
Mason County	16,634	17,377	Litchfield....	6,215	5,971
Bath.....	408	475	Nokomis....	3,465	1,872
Easton.....	456	407	Panama.....	1,281	708
Forest City..	314	306	Raymond....	868	881
Havana.....	3,614	3,525	Schram City.	1,200	516
Kilbourne...	393	424	Taylor		
Manito.....	758	696	Springs....	1,526	380
Mason City..	1,880	1,842	Walshville...	180	169
San Jose.....	566	446	Waggoner...	307	270
Topeka.....	109	130	Wenona.....	299	...
Massac County	13,559	14,200	Witt.....	2,443	2,170
Brookport...	1,098	1,443	Morgan County	33,567	34,420
Joppa.....	651	734	Chapin.....	565	552
Metropolis...	5,055	4,658	Concord.....	318	...
Menard			Franklin....	611	696
County....	11,694	12,796	Jacksonville.	15,713	15,326
Athens City..	1,241	1,340	Lynnville....	123	94
Greenview...	755	921	Meredosia...	810	951
Oakford....	351	317	Murrayville..	523	450
Petersburg...	2,432	2,587	South Jack-		
Tallula.....	761	742	sonville....	435	...
Mercer County	18,800	19,723	Waverly....	1,510	1,538
Aledo.....	2,231	2,144	Woodson....	231	257
Cable.....	†	360	Moultrie		
Joy.....	529	516	County....	14,839	14,630
Keithsburg..	1,148	1,515	Allenville....	286	245
Mathersville.	886	...	Arthur.....	998	1,080
New Boston..	714	718	Bethany.....	842	859
Seaton.....	297	326	Dalton City..	446	400
Sherrard....	437	906	Gays.....	274	322
Swedona....	†	97	Lovington...	1,479	1,011
Viola.....	668	760	Sullivan....	2,532	2,621
Windsor.....	484	660	Ogle County...	26,793	27,864
Monroe			Adeline.....	140	155
County....	12,839	13,508	Byron.....	855	932
Burksville...	173	187	Creston.....	290	323
Columbia....	1,592	2,076	Forreston....	884	870
Hecker.....	159	187	Leaf River...	388	469
Maeystown..	270	284	Mount		
Renault.....	209	241	Morris....	1,250	1,132

† Not returned separately.

	1920	1910		1920	1910
Oregon.....	2,227	2,180	Pope County....	9,625	11,215
Polo.....	1,867	1,828	Eddyville.....	173	145
Rocheille.....	3,310	2,732	Golconda.....	1,242	1,088
Peoria			Hamletsburg.....	219	215
County.....	111,710	100,255	Pulaski County.	14,629	15,650
Averyville...	3,815	2,668	Mound City	2,756	2,837
Bartonville..	1,588	1,536	Mounds.....	2,661	1,686
Brimfield....	617	576	New Grand		
Chillicothe...	1,986	1,851	Chain.....	397	490
Elmwood....	1,242	1,390	Olmsted.....	318	288
Glasford.....	645	625	Pulaski.....	518	592
Hanna City..	975	...	Ullin.....	652	670
Kingston			Wetaug.....	132	218
Mines.....	360	492	Putnam		
North			County.....	7,579	7,561
Chillicothe.	1,002	911	Granville....	1,427	1,391
Peoria.....	76,121	66,950	Hennepin.....	377	451
Peoria			Magnolia.....	1,066	368
Heights ...	1,111	582	Mark.....	1,300	1,025
Princeville...	1,035	982	Standard.....	980	793
Perry County..	22,901	22,088	Randolph		
Cutler.....	363	324	County.....	29,109	29,120
Duquoin....	7,285	5,454	Baldwin.....	353	358
Pinckneyville	2,649	2,722	Chester.....	2,904	2,747
St. John.....	353	370	Coulterville..	1,407	949
Tamaroa....	1,115	910	Ellis Grove...	269	252
Willisville...	1,485	1,082	Evansville...	575	562
Piatt County...	15,714	16,376	Kaskaskia...	152	142
Atwood.....	883	659	Modoc.....	237	..
Bement.....	1,663	1,530	Percy.....	†	1,033
Cerro Gordo.	1,003	876	Prairie du		
Cisco.....	345	379	Rocher.....	535	511
De Land....	542	503	Red Bud....	1,141	1,240
Hammond....	459	492	Rockwood...	153	140
Mansfield...	669	681	Ruma.....	†	138
Monticello...	2,280	1,981	Sparta.....	3,340	3,081
Pike County ..	26,866	28,622	Steelyville...	702	708
Barry.....	1,490	1,647	Tilden.....	1,137	774
Baylis.....	388	385	Richland		
Detroit.....	129	127	County....	14,044	15,970
El Dara.....	165	195	Calhoun.....	230	..
Griggsville...	1,343	1,262	Claremont...	186	186
Hull.....	648	541	Noble.....	580	618
Kinderhook..	332	371	Olney.....	4,491	5,011
Milton.....	348	330	Rock Island		
Nebo.....	549	520	County....	92,297	70,404
New Canton..	540	473	Andalusia ..	228	299
New Salem...	262	260	Carbon Cliff ..	400	366
Pearl.....	669	842	Coal Valley ..	184	190
Perry.....	491	649	Cordova.....	271	324
Pittsfield....	2,129	2,095	East Moline..	8,675	2,665
Pleasant Hill.	433	576	Hampton....	460	348
Time.....	95	158	Milan.....	850	727

† Not returned separately.

	1920	1910		1920	1910
Moline.....	30,734	24,199	Illiopolis.....	814	849
Port Byron..	510	642	Loami.....	462	530
Rapids City..	142	143	Mechanics-		
Reynolds....	322	387	burg.....	470	417
Rock Island..	35,177	24,335	New Berlin..	687	690
Silvis.....	2,541	1,163	Pawnee.....	1,200	1,399
St. Clair			Pleasant		
County....	136,411	119,870	Plains.....	1,078	625
Belleville....	24,741	21,122	Riverton.....	1,916	1,911
Brooklyn....	1,685	1,569	Rochester...	399	444
Caseyville...	675	613	Spaulding...	237	308
Dupo.....	1,393	433	Springfield...	59,183	51,678
East Car-			Thayer.....	1,254	1,012
ondelet....	311	212	Williamsville.	652	600
East			Schuylerville		
St. Louis..	66,740	58,547	County....	13,285	14,852
Fayetteville..	174	228	Browning....	456	551
Freeburg....	1,594	1,397	Littleton....	300	...
Lenzburg....	502	463	Rushville....	2,275	2,422
Marissa....	1,900	2,004	Scott County...	9,489	10,067
Mascoutah...	2,343	2,081	Bluffs.....	1,009	766
Millstadt....	907	1,140	Exeter.....	167	201
National City	426	253	Glasgow....	235	215
New Athens..	1,406	1,131	Manchester..	456	480
O'Fallon....	2,379	2,018	Naples.....	384	457
Old Marissa..	232	314	Winchester..	1,540	1,639
St. Libory...	289	328	Shelby County.	29,601	31,693
Shiloh.....	381	395	Cowden.....	†	711
Smithton....	357	380	Fancher.....	113	215
Sumnerfield..	277	337	Findlay.....	882	827
Swansea.....	1,048	889	Herrick.....	601	618
Saline County..	38,353	30,204	Moweaqua...	1,591	1,513
Beulah			Oconee.....	318	293
Heights...	549	...	Shelbyville...	3,568	3,590
Carrier Mills.	2,343	1,558	Sigel.....	292	308
Dorrisville...	1,740	1,184	Stewardson..	575	720
Eldorado....	5,004	3,366	Strasburg....	469	526
Galatia.....	863	745	Tower Hill...	769	1,040
Gaskins.....	834	685	Windsor.....	1,000	987
Harrisburg...	7,125	5,309	Stark County..	9,693	10,098
Ledford.....	673	599	Bradford....	915	770
Muddy.....	336	...	La Fayette...	258	287
Raleigh.....	264	238	Toulon.....	1,235	1,208
Sangamon			Wyoming....	1,376	1,506
County...	100,262	91,024	Stephenson		
Auburn.....	2,660	1,814	County....	37,743	36,821
Barclay.....	51	252	Baalton....	187	144
Berlin.....	241	251	Cedarville...	1,163	311
Buffalo.....	475	475	Dakota.....	248	227
Cantrall....	187	318	Davis.....	337	352
Chatham....	848	666	Freeport....	19,669	17,567
Dawson....	602	620	Lena.....	1,149	1,168
Divernon....	2,382	1,519	Orangeville..	423	370

† Not returned separately.

	1920	1910		1920	1910
Pearl City . . .	468	485	Keensburg . . .	354	405
Ridott	1,175	173	Mount		
Rock City . . .	159	122	Carmel	7,456	6,934
Winslow	371	426	Warren		
Tazewell			County	21,488	23,313
County	38,540	34,027	Alexis	830	829
Armington . . .	368	327	Kirkwood . . .	882	926
Delavan	1,191	1,175	Little York . .	355	358
Deer Creek . . .	344	332	Monmouth . . .	8,116	9,128
East Peoria . .	2,214	1,493	Roseville	952	882
Green Valley . .	446	...	Washington		
Hopedale	556	586	County	18,035	18,759
Mackinaw	828	725	Addieville . . .	300	269
Minier	789	690	Ashley	751	913
Morton	1,194	1,004	Dubois	443	351
Pekin	12,086	9,897	Hoyleton	527	451
South Pekin . . .	944	...	Irvington	258	223
Tremont	976	782	Nashville	2,209	2,135
Washington	1,643	1,530	New Minden . . .	364	245
Union County . . .	20,249	21,856	Okawville	614	579
Alto Pass	500	551	Richview	330	366
Anna	3,019	2,809	Venedy	345	160
Cobden	688	988	Wayne County . .	22,772	25,697
Dongola	660	702	Cisne	526	373
Jonesboro	1,090	1,169	Fairfield	2,754	2,479
Mill Creek	209	221	Golden Gate . . .	265	311
Vermilion			Jeffersonville . .	322	237
County	86,235	77,996	Johnsonville . . .	133	225
Allerton	†	364	Mount Erie	230	290
Alvin	367	319	Sims	429	399
Belgium	489	433	Wayne City	561	620
Brookville	242	398	White County . . .	20,081	23,052
Catlin	681	952	Carmi	2,667	2,833
Danville	33,750	27,871	Crossville	558	574
Fairmount	870	847	Enfield	929	927
Fithian	482	386	Grayville	1,749	1,940
Georgetown	3,061	2,307	Maunie	480	512
Henning	347	364	Mill Shoals	356	700
Hoopeston	5,451	4,698	Norris City	1,300	1,055
Indianola	359	365	Phillipstown	70	105
Marysville	733	742	Springerton	318	418
Muncie	248	251	Whiteside		
Oakwood	573	423	County	36,174	34,507
Rankin	944	858	Albany	491	618
Ridge Farm	851	967	Coleta	174	...
Rossville	1,051	1,422	Erie	957	804
Sidell	800	741	Fulton	2,445	2,174
Tilton	909	710	Lyndon	325	390
Westville	4,241	2,607	Morrison	3,000	2,410
Wabash			Prophetstown	1,159	1,083
County	14,034	14,913	Rock Falls	2,927	2,657
Allendale	451	...	Sterling	8,182	7,467
Bellmont	464	550	Tampico	788	849

† Not returned separately.

	1920	1910		1920	1910
Will County . . .	92,837	84,371	Johnston		
Beecher . . .	609	543	City	7,137	3,248
Braidwood . . .	1,297	1,958	Marion	9,582	7,093
Crete	945	840	Pittsburg	670	227
Elwood	212	211	Reeves	779	658
Frankfort	497	273	Spillertown . . .	186	249
Godley	83	184	White Ash	381	353
Joliet	38,406	34,670	Winnebago		
Lockport	2,684	2,555	County	90,929	63,153
Manhattan	525	443	Cherry Valley . . .	480	433
Mokena	475	359	Durand	549	527
Monee	395	411	Pecatonica	1,088	1,022
Peotone	1,090	1,207	Rockford	65,651	45,401
Plainfield	1,147	1,019	Rockton	899	841
Rockdale	1,478	1,101	South Beloit . . .	1,436	...
Romeoville	74	98	Winnebago	495	415
Steger	2,304	2,161	Woodford		
Williamson			County	19,154	20,506
County	61,038	45,098	Benson	414	362
Bolton	456	485	El Paso	1,638	1,470
Bush	962	565	Eureka	1,559	1,525
Carterville	3,404	2,971	Kappa	149	142
Colp	584	...	Metamora	497	694
Crainville	557	446	Minonk	2,109	2,070
Creal Springs . . .	1,002	936	Panola	98	108
Fordville	792	385	Roanoke	1,368	1,311
Freeman	325	...	Secor	311	358
Herrin	10,986	6,861	Spring Bay	89	119
Hurst	1,222	345	Washburn	830	777

CITIES OF ILLINOIS, EACH HAVING 2,500 INHABITANTS
OR MORE IN 1920

Rank in 1920	1920	1910	Rank in 1920	1920	1910
1. Chicago	2,701,705	2,185,283	19. Alton	24,682	17,528
2. Peoria	76,121	66,950	20. Galesburg	23,785	22,089
3. E. St. Louis	66,740	58,547	21. Freeport	19,669	17,567
4. Rockford	65,651	45,401	22. Chicago		
5. Springfield	59,183	51,678	Heights	19,653	14,525
6. Cicero	44,995	14,557	23. Waukegan	19,226	16,069
7. Decatur	43,818	31,140	24. Kankakee	16,721	13,986
8. Oak Park	39,858	19,444	25. Kewanee	16,026	9,307
9. Joliet	38,406	34,670	26. Champaign	15,873	12,421
10. Evanston	37,234	24,978	27. Jacksonville	15,713	15,326
11. Aurora	36,397	29,807	28. Cairo	15,203	14,548
12. Quincy	35,978	36,587	29. Streator	14,779	14,253
13. Rock Island	35,177	24,335	30. Granite City	14,757	9,903
14. Danville	33,750	27,871	31. Berwyn	14,150	5,841
15. Moline	30,734	24,199	32. Mattoon	13,552	11,456
16. Bloomington	28,725	25,768	33. La Salle	13,050	11,537
17. Elgin	27,454	25,976	34. Centralia	12,491	9,680
18. Belleville	24,741	21,122	35. Pekin	12,086	9,897

Rank in 1920	1920	1910	Rank in 1920	1920	1910
36. Maywood....	12,072	8,033	83. Hoopeston....	5,451	4,698
37. Lincoln.....	11,882	10,892	84. Edwardsville....	5,336	5,014
38. Blue Island..	11,424	8,043	85. Savanna.....	5,237	3,691
39. Herrin.....	10,986	6,861	86. Carlinville....	5,212	3,616
40. Canton.....	10,928	10,453	87. Normal.....	5,143	4,024
41. Ottawa.....	10,816	9,535	88. Lawrenceville....	5,080	3,235
42. Forest Park..	10,768	6,594	89. Hillsboro....	5,074	3,424
43. Murphysboro.	10,703	7,485	90. Metropolis....	5,055	4,658
44. Urbana.....	10,244	8,245	91. Eldorado....	5,004	3,366
45. Mount Vernon....	9,815	8,007	92. Madison....	4,996	5,046
46. Collinsville....	9,753	7,478	93. Galena.....	4,742	4,855
47. Marion.....	9,582	7,093	94. Virden.....	4,682	4,000
48. Harvey.....	9,216	7,227	95. Des Plaines....	4,640	2,348
49. Peru.....	8,869	7,984	96. Elmhurst....	4,594	2,360
50. East Moline..	8,675	2,665	97. Hinsdale....	4,513	2,451
51. West Frank- fort.....	8,478	2,111	98. Morris.....	4,505	4,563
52. Dixon.....	8,191	7,216	99. Olney.....	4,491	5,011
53. Sterling....	8,182	7,467	100. Batavia....	4,395	4,436
54. Monmouth..	8,116	9,128	101. River Forest..	4,358	2,456
55. Paris.....	7,985	7,664	102. Westville....	4,241	2,607
56. DeKalb.....	7,871	8,102	103. Wheaton....	4,137	3,423
57. Wilmette....	7,814	4,943	104. Oglesby....	4,135	3,194
58. Belvidere....	7,804	7,253	105. Princeton....	4,126	4,131
59. West Hammond.	7,492	4,948	106. St. Charles....	4,099	4,046
60. Mount Carmel....	7,456	6,934	107. Gillespie....	4,063	2,241
61. Duquoin....	7,285	5,454	108. Effingham....	4,024	3,898
62. Benton.....	7,201	2,675	109. Summit.....	4,019	949
63. Melrose Park.	7,147	4,806	110. Mendota....	3,934	3,806
64. Johnston City	7,137	3,248	111. Venice.....	3,895	3,718
65. Harrisburg....	7,125	5,309	112. Jerseyville....	3,839	4,113
66. Beardstown..	7,111	6,017	113. Naperville....	3,830	3,449
67. Macomb.....	6,714	5,774	114. Christopher....	3,830	1,825
68. Winnetka....	6,694	3,168	115. Averyville....	3,815	2,668
69. Pontiac.....	6,664	6,090	116. Havana.....	3,614	3,525
70. Charleston....	6,615	5,884	117. Sycamore....	3,602	3,986
71. LaGrange....	6,525	5,282	118. Brookfield....	3,589	2,186
72. Spring Valley.	6,493	7,035	119. Shelbyville....	3,568	3,590
73. Carbondale...	6,267	5,411	120. Flora.....	3,558	2,704
74. Litchfield....	6,215	5,971	121. Downers Grove....	3,543	2,601
75. Highland Park.....	6,167	4,209	122. Mount Olive....	3,503	3,501
76. Pana.....	6,122	6,055	123. Woodriver....	3,476	84
77. Staunton....	6,027	5,048	124. Nokomis....	3,465	1,872
78. Clinton.....	5,898	5,165	125. Salem.....	3,457	2,669
79. North Chicago....	5,839	3,306	126. Frankfort Heights....	3,423	...
80. Taylorville....	5,806	5,446	127. Carterville....	3,404	2,971
81. Zion City....	5,580	4,789	128. Marseilles....	3,391	3,291
82. Woodstock....	5,523	4,331	129. Park Ridge....	3,383	2,009
			130. Glencoe....	3,381	1,899
			131. Geneseo....	3,375	3,199
			132. Robinson....	3,368	3,863
			133. Lake Forest..	3,363	3,349

Rank in 1920	1920	1910	Rank in 1920	1920	1910
134. Sparta.....	3,340	3,081	153. Geneva.....	2,803	2,451
135. Vandalia.....	3,316	2,974	154. Mound City..	2,756	2,837
136. Benld.....	3,316	1,912	155. Fairfield.....	2,754	2,479
137. Rochelle.....	3,310	2,732	156. Abingdon.....	2,721	2,464
138. Harvard.....	3,294	3,008	157. Bushnell.....	2,716	2,619
139. Greenville....	3,071	3,178	158. Lockport.....	2,684	2,555
140. Georgetown..	3,061	2,307	159. Carmi.....	2,667	2,833
141. Paxton.....	3,033	2,912	160. Mounds.....	2,661	1,686
142. Anna.....	3,019	2,809	161. Auburn.....	2,660	1,814
143. Morrison.....	3,000	2,410	162. Pinckneyville.	2,649	2,722
144. Galva.....	2,974	2,498	163. West Chicago	2,594	2,378
145. White Hall...	2,954	2,854	164. Tuscola.....	2,564	2,453
146. Roodhouse...	2,928	2,171	165. Lyons.....	2,564	1,483
147. Rock Falls...	2,927	2,657	166. Silvis.....	2,541	1,163
148. Chester.....	2,904	2,747	167. Sullivan.....	2,532	2,621
149. Highland....	2,902	2,675	168. Fairbury.....	2,532	2,505
150. Glenellyn....	2,851	1,763	169. Riverside....	2,532	1,702
151. Sesser.....	2,841	1,292	170. Depue.....	2,525	1,339
152. Watseka.....	2,817	2,476	171. Toluca.....	2,503	2,407

APPENDIX

A LIST OF THE GENERAL REFERENCES FOR THE STUDY OF THE GEOGRAPHY OF ILLINOIS

There is a wealth of source material, both state and national, upon which the student may draw for a more intensive study of the state. Some of the more important titles follow.

PUBLICATIONS OF THE STATE GEOLOGICAL SURVEY

The State Geological Survey, Urbana, Illinois, will furnish on request a descriptive circular of all their publications, with prices. The following are of especial value in the study of the geography of the state.

Bulletin 1. *The Geological Map of Illinois*, by Stuart Weller. Urbana: University of Illinois, 1906. 26 pages. Bulletin 6, second edition of same. Urbana: University of Illinois, 1907. 37 pages.

Bulletin 2. *The Petroleum Industry of Southeastern Illinois*, by W. S. Blatchley. Urbana: University of Illinois, 1906. 109 pages.

Bulletin 7. *Physical Geography of the Evanston-Waukegan Region*, by Wallace W. Atwood and James Walter Goldthwait. Urbana: University of Illinois, 1908. 102 pages.

Bulletin 11. *The Physical Features of the Des Plaines Valley*, by James Walter Goldthwait. Urbana: University of Illinois, 1909. 103 pages.

Bulletin 12. *Physiography of the St. Louis Area*, by N. M. Fenneman. Urbana: University of Illinois, 1909. 81 pages.

Bulletin 13. *The Mississippi Valley between Savanna and Davenport*, by J. Ernest Carman. Urbana: University of Illinois, 1909. 96 pages.

Bulletin 15. *Geography of the Middle Illinois Valley*, by Harlan H. Barrows. Urbana: University of Illinois, 1910. 128 pages.

Bulletin 17. *Portland Cement Resources of Illinois*, by A. V. Bleigner, E. F. Lines, and F. E. Layman. Urbana: University of Illinois, 1912. 121 pages.

Bulletin 19. *Geology and Geography of the Wheaton Quadrangle*, by Arthur C. Trowbridge. Urbana: University of Illinois, 1912. 79 pages.

Bulletin 21. *Lead and Zinc Deposits of Northwestern Illinois*, by G. H. Cox. Urbana: University of Illinois, 1914. 120 pages.

Bulletin 22. *The Oil Fields of Crawford and Lawrence Counties*, by Raymond S. Blatchley. Urbana: University of Illinois, 1913. 442 pages.

Bulletin 25. *Report and Plans for Reclamation of Land Subject to Overflow in the Embarras River Valley*, by Harman Engineering Company. Urbana: University of Illinois, 1913. 61 pages.

Bulletin 26. *Geology and Geography of the Galena and Elizabeth Quadrangles*, by Arthur C. Trowbridge, E. W. Shaw, and Bernard H. Schockel. Urbana: University of Illinois, 1916. 233 pages.

Bulletin 27. *Geography of the Upper Illinois Valley*, by Carl O. Sauer. Urbana: University of Illinois, 1916. 208 pages.

Bulletin 28. *Gas and Oil in Bond, Macoupin, and Montgomery Counties*, by Raymond S. Blatchley. Urbana: University of Illinois, 1914. 50 pages.

Bulletin 31. *Oil Investigations in Illinois in 1914*, by Fred H. Kay and others. Urbana: University of Illinois, 1915. 111 pages.

Bulletin 32. *Report and Plans for Reclamation of Land Subject to Overflow in the Spoon River Valley*, by Harman Engineering Company. Urbana: University of Illinois, 1916. 57 pages.

Bulletin 35. *Oil Investigations in Illinois in 1916*, by Fred H. Kay, Albert D. Brokaw, and Stuart St. Clair. Urbana: University of Illinois, 1917. 80 pages.

Bulletin 37. *Geology of the LaSalle and Hennepin Quadrangles*, by Gilbert H. Cady. Urbana: University of Illinois, 1919. 136 pages.

Bulletin 39. *The Environment of Camp Grant*, by Rollin D. Salisbury and Harlan H. Barrows. Urbana: University of Illinois, 1918. 75 pages.

Bulletin 40. *Oil Investigations in Illinois in 1917 and 1918*, by M. L. Nebel and others. Urbana: University of Illinois, 1919. 144 pages.

Small quadrangles bounded by certain meridians are mapped in co-operation with the United States Geological Survey. The maps and description of each quadrangle are published in the form of a folio which is designated by the name of the principal town within the quadrangle. The folio contains topographic, geologic, and economic maps, together with a descriptive text. The folio constitutes the most complete and authentic information available concerning the geology and geography of the area included in the quadrangle. These folios should be ordered from The Director, United States Geological Survey, Washington, D.C.

Folio 67. *Danville Quadrangle*. Washington, D.C., 1900. 10 pages.

Folio 81. *Chicago Quadrangle*, by William C. Alden. Washington, D.C., 1902. 13 pages.

Folio 105. *Patoka Quadrangle*, by Myron L. Fuller and Frederick G. Clapp. Washington, D.C., 1904. 12 pages.

Folio 145. *Lancaster and Mineral Point Quadrangles*.

Folio 185. *Murphysboro and Herrin Quadrangles*, by E. W. Shaw and T. E. Savage. Washington, D.C., 1912. 15 pages.

Folio 188. *Tallula and Springfield Quadrangles*, by E. W. Shaw and T. E. Savage. Washington, D.C., 1913. 12 pages.

Folio 195. *Belleville and Breese Quadrangles*, by J. A. Udden and E. W. Shaw. Washington, D.C., 1915. 13 pages.

Folio 200. *Galena and Elizabeth Quadrangles*.

Folio 208. *Colchester and Macomb Quadrangles*, by Henry Hinds. Washington, D.C., 1919. 14 pages.

Geological Map of Illinois. Scale approximately one inch to eight miles.

Base Map of Illinois. Scale approximately one inch to eight miles. Shows all railroads, cities, villages, and stations. Excellent for school or home.

County Topographic Maps. In four colors. Scale approximately one inch to the mile. Shows public land lines, railroads, roads, houses, churches, schools, rivers, creeks, divides, surface configuration and elevation above sea-level at all points. The most detailed county maps available. Excellent for the schools, homes, and offices of the county. Those so far issued are: St. Clair County, Clinton County, Monroe County, Gallatin County, Hardin County, Lawrence County, McDonough County, Randolph County.

Starved Rock State Park Topographic Map. Scale approximately two inches to the mile. Valuable for tourists visiting the Park.

Drainage Maps. Topographic maps on the scale of about three inches to the mile. Useful in planning reclamation projects, especially in connection with Bulletins 25 and 32.

Big Muddy River, 5 sheets.

Embarras River and North Fork, 8 sheets.

Kaskaskia River, 13 sheets.

Pecatonica River, 4 sheets.

Spoon River, 3 sheets.

Quadrangle Topographic Maps. Scale about one inch to the mile; size of quadrangle one-fourth of a square degree, about 17 miles in north-south extent and 13 miles east-west, area about 225 square miles; the best detailed maps published. About one-third of the area of the state is included in the maps now available. Eighty-three maps representing portions of 68 counties have been issued. The maps are given in the list of publications of the State Geological Survey. An index map, available on request, from the State Geological Survey, has been prepared to show the exact areas covered by these quadrangles. The topographic maps, like the geologic folios, are designated by the name of the principal town within the quadrangle. The topographic map of a quadrangle is included in the geologic folio of the quadrangle. The topographic map is a single sheet while the geologic folio contains several maps, much descriptive material, and numerous diagrams and pictures. The following is an alphabetical list of topographic maps issued to date: Avon, Baldwin, Belleville, Belvidere, Birds, Breese, Brownfield, Calumet, Canton, Carlyle, Centralia, Chester, Chicago, Clinton, Colchester, Coulterville, Crystal City, Danville, Davenport, Des Plaines, Dixon, Dunlap, Edgington, Eldorado, Elizabeth, Equality, Evanston, Ford's Ferry, Galatia, Galena, Gillespie, Golconda, Good Hope, Hardinville, Hennepin, Herrin, Highwood, Joliet, Kimmick, Kings, Kirkland, Lacon, La Harpe, Lancaster, La Salle, LeClaire, Lincoln, Louisiana, Macomb, Mahomet, Marseilles, Metamora, Milan, Mineral Point, Morris, Mount Carmel, Mount Olive, Murphysboro, New Athens, New Harmony, New Haven, O'Fallon, Okawville, Ottawa, Peoria, Renault, Riverside, Rockford, Savanna, Shawneetown, Springfield, St. Louis and East St. Louis, Sumner, Tallula, Urbana, Vermont, Vienna, Vincennes, Waterloo, West Frankfort, Waukegan, Wheaton, Wilmington.

UNITED STATES GEOLOGICAL SURVEY

Some of the publications of the United States Geological Survey deal directly with the geology, geography, and resources of Illinois. Some of these may be secured without cost through Illinois congressmen. Prices may be obtained from Superintendent of Documents, Washington, D.C.

Twenty-second Annual Report U.S. Geological Survey. Part III, "The Eastern Interior Coal Field," by G. H. Ashley, pp. 265-305.

Monograph 38. *The Illinois Glacial Lobe*, by Frank Leverett. The most complete description available of the glacial topography of Illinois. It is used as the basis for the soil surveys of the state. Washington, D.C., 1899. 817 pages.

Bulletin 246. *Zinc and Lead Deposits of Northwestern Illinois*, by H. F. Bain. Washington, D.C., 1904. 56 pages.

Bulletin 255. *The Fluorspar Deposits of Southern Illinois*, by H. F. Bain. Washington, D.C., 1905. 75 pages.

Bulletin 294. *Zinc and Lead Deposits of the Upper Mississippi Valley*, by H. F. Bain. Washington, D.C., 1906. 156 pages.

Bulletin 438. *Geology and Mineral Resources of the St. Louis Quadrangle, Mo.-Ill.*, by N. M. Fenneman. Washington, D.C., 1911. 69 pages.

Bulletin 506. *Geology and Mineral Resources of the Peoria Quadrangle*, by J. A. Udden. Washington, D.C., 1912. 103 pages.

UNITED STATES WEATHER BUREAU PUBLICATIONS

Bulletin Q. *Climatology of the United States*, by Alfred Judson Henry. Washington, D.C., 1906. 1007 pages.

Climatological Data, Illinois Section, monthly and annual summaries of weather conditions throughout the state. Issued by U.S. Weather Bureau, Springfield, Illinois. Free. Clarence J. Root. About 8 pages per month and about 108 pages per year, including annual report.

ILLINOIS LABORATORY OF NATURAL HISTORY,
URBANA, ILLINOIS

The general geography of the state and of various regions of the state is treated in an instructive and interesting manner in many articles, the titles of which are of a somewhat technical nature.

Volume I (1889) and Volume II (1895), *Ornithology of Illinois*, by Robert Ridgway and Stephen A. Forbes. Springfield, 1889. 802 pages.

Volume III, Article IX, *A Preliminary Report on the Animals of the Mississippi Bottoms near Quincy, Illinois, in August, 1888*, by H. Garman.

Volume IV, Article IV, *List of Altitudes in the State of Illinois*, by C. W. Rolfe.

Volume VI, Article II, *The Plankton of the Illinois River, 1894-1899, with Introductory Notes upon the Hydrography of the Illinois River and Its Basin*, by C. A. Kofoid. Urbana: University of Illinois. 361 pages.

Volume VII, Article VII, January, 1907, *On the Biology of the Sand Areas of Illinois*, by Charles A. Hart and Henry Allan Gleason.

Volume VII, Article IX, *An Ornithological Cross-Section of Illinois in Autumn*, by S. A. Forbes.

Volume VIII, Article III, *On the General and Interior Distribution of Illinois Fishes*, by S. A. Forbes.

Volume VIII, Article V, *A Study of the Mammals of Champaign County, Illinois*, by Frank Elmer Wood.

Volume IX, Article I, *On the Common Shrew Mole in Illinois*, by Frank Elmer Wood. Article III, October, 1910, *The Vegetation of the Inland Sand Deposits of Illinois*. Article IV, January, 1911, *Forest Conditions in Illinois*, by R. Clifford Hall and O. D. Ingall. Article V, March, 1912, *The Vegetation of the Beach Area in Northeastern Illinois and Southeastern Wisconsin*, by Frank Caleb Gates. Article VI, January, 1913, *The Mid-summer Bird Life of Illinois: A Statistical Study*, by Stephen A. Forbes. Article X, *Studies on the Biology of the Upper Illinois River*, by Stephen A. Forbes and R. E. Richardson. Article XI, August, 1913, *Vegetation of Skokie Marsh*, by Earl E. Sherff.

Volume X, Article I, September, 1913, *An Associational Study of Illinois Sand Prairie*, by Arthur G. Vestal.

Volume XI, Article I, July, 1915, *An Outline of the Relations of Animals to Their Inland Environments*, by Charles C. Adams. Article II, September, 1915, *An Ecological Study of Prairie and Forest Invertebrates*, by Charles C. Adams. Article III, *The Vertebrate Life of Certain Prairie and Forest Regions near Charleston, Illinois*, by T. L. Hankinson.

Volume XII, Article I, September, 1915, *The Relation of Evaporation and Soil Moisture to Plant Succession in a Ravine*, by Fred Theodore Ullrich.

"ILLINOIS BLUE BOOK"

The *Illinois Blue Book* is a biennial publication, 1899 to date, compiled by the Secretary of State, and may be obtained from Secretary of State,

Springfield. It contains information concerning all departments of the state government and much historical and descriptive matter. The eleven volumes already issued contain a large fund of authentic information concerning the development of the state during the past twenty years.

ILLINOIS CENTENNIAL MEMORIAL HISTORY

The six volumes of the *Centennial Memorial History* give a complete and authentic account of Illinois from earliest historic times to the close of the first century of statehood in 1918.

Published by the Illinois Centennial Commission, for sale by A. C. McClurg & Co., Chicago.

A complete set of this history has been given by the Centennial Commission to each of the public libraries of the state.

Preliminary Volume. *Illinois in 1818*, by Solon J. Buck. Springfield, 1917. 362 pages.

Volume I. *Province and Territory, 1673-1818*, by Clarence W. Alvord.

Volume II. *The Frontier State, 1818-1848*, by Theodore Calvin Pease. Springfield, 1918. 475 pages.

Volume III. *The Era of the Civil War, 1848-1870*, by Arthur Charles Cole. Springfield, 1919. 499 pages.

Volume IV. *The Industrial State, 1870-1898*, by Charles Manfred Thompson.

Volume V. *The Modern Commonwealth, 1898-1918*, by Ernest Ludlow Bogart and John Mabry Mathews. Springfield, 1918. 544 pages.

OTHER STATE PUBLICATIONS

These publications may be obtained by application to the Secretary of State or to the departments issuing them.

Annual Coal Reports. These reports give detailed statistics of coal production, mines, and miners for the year.

Reports of State Superintendent of Public Instruction. An annual statistical report, and a comprehensive biennial report. Bulletins and circulars of value to school officials and to teachers.

Reports of the Game and Fish Commission. An interesting summary of Illinois resources in game and fish with suggestions for their conservation. Annual reports were first published in 1913.

Reports of the Rivers and Lakes Commission.

Water Resources of Illinois, by A. H. Horton. Springfield, 1914. 400 pages.

The Illinois River and Its Bottom Lands, by John W. Alvord and Charles E. Burdick. Springfield, 1915. 141 pages.

By Department of Public Works and Buildings, State Parks and Memorials, compiled by C. M. Service. Springfield, 1920. 50 pages.

PUBLICATIONS OF THE GEOGRAPHIC SOCIETY OF CHICAGO

For sale by the University of Chicago Press, Chicago.

No. 1. *The Geography of Chicago and Its Environs*, by Rollin D. Salisbury and William C. Alden. Chicago, 1899. 64 pages.

No. 2. *The Plant Societies of Chicago and Vicinity*, by Henry C. Cowles.

No. 4. *The Weather and Climate of Chicago*, by Henry J. Cox and John H. Armington. Chicago, 1914. 371 pages.

No. 6. *Starved Rock State Park and Its Environs*, by Carl O. Sauer, Gilbert H. Cady, and Henry Cowles. Chicago, 1918. 148 pages.

EXCURSION BULLETINS

No. 1. *Excursion through the Rivers and Harbors of Chicago*, by R. E. Blount and C. S. Jewell.

No. 2. *Excursion on the Rock River of Illinois between Rockford and Dixon*, by R. E. Blount.

No. 3. *Stony Island*, by Zonia Baber.

AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF ILLINOIS, URBANA, ILLINOIS

The Agricultural Experiment Station of the University of Illinois publishes many bulletins, circulars, and soil reports. *Bulletins* report the results of the investigations carried on by the Experiment Station. *Circulars* are essays on various phases of agriculture of interest to Illinois farmers. *County Soil Reports* contain detailed information regarding the soil types on every farm in the county, their extent, location, and fertility invoice; also a colored map of the different types down to areas of ten-acre units, and recommendations for permanent systems of management.

These publications are sent free on request. A list of those available may be obtained and selections made. An interested person may have his name placed on the regular mailing list and receive new publications as issued. The current list of available publications includes seventy-nine bulletins, eighty-seven circulars, and eighteen county soil reports. These are classified under Soils and Crops; Soil Reports; Animal Husbandry; Dairy; Horticulture; Entomology; and Agricultural Extension Division.

The following selections, made from the lists on Soils and Crops and Soil Reports contain much valuable material within the scope of this volume.

BULLETINS

Bulletin 76. *Alkalja on Illinois Soils*, by Cyril G. Hopkins. Urbana: University of Illinois, 1902. Pages 311-48.

Bulletin 123. *Fertility in Illinois Soils*, by Cyril G. Hopkins and J. H. Pettit. Urbana: University of Illinois, 1908. Pages 187-294.

Bulletin 157. *Peaty Swamp Lands; Sand and "Alkali" Soils*, by Cyril G. Hopkins, J. E. Readhimer, and O. S. Fisher. Urbana: University of Illinois, 1912. Pages 95-131.

Bulletin 181. *Soil Moisture and Tillage for Corn*, by J. S. Mosier and A. F. Gustafson. Urbana: University of Illinois, 1915. Pages 565-81.

Bulletin 193. *Summary of Illinois Soil Investigations*, by Cyril G. Hopkins, J. G. Mosier, and F. C. Bauer. Urbana: University of Illinois, 1916. Pages 439-84.

Bulletin 207. *Washing of Soils and Methods of Prevention*, by J. G. Mosier and A. F. Gustafson. Urbana: University of Illinois, 1918. Pages 513-50.

Bulletin 208. *Climate of Illinois*, by J. G. Mosier. Urbana: University of Illinois, 1918. 125 pages.

Bulletin 219. *Illinois Crop Yields from Soil Experiment Fields*.

CIRCULARS

Circular 109. *Improvement of Upland Timber Soils of Illinois* (with special reference to northern Illinois), by Cyril G. Hopkins and J. E. Readhimer. Urbana: University of Illinois, 1907. 8 pages.

Circular 123. *The Status of Soil Fertility Investigations*, by Cyril G. Hopkins and J. H. Pettit. Urbana: University of Illinois, 1908. 294 pages.

Circular 145. *The Story of a King and Queen (Corn and Clover)*.

Circular 167. *The Illinois System of Permanent Fertility*, by Cyril G. Hopkins. Urbana: University of Illinois, 1913. 20 pages.

Circular 193. *Why Illinois Produces Only Half a Crop*, by Cyril G. Hopkins. Urbana: University of Illinois, 1917. 16 pages.

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2. *Moultrie County*, by Cyril G. Hopkins, J. G. Mosier, J. H. Pettit, and J. E. Readhimer. Urbana: University of Illinois, 1911. 38 pages.
3. *Hardin County*, by Cyril G. Hopkins, J. G. Mosier, J. H. Pettit, and J. E. Readhimer. Urbana: University of Illinois, 1912. 33 pages.
4. *Sangamon County*, by Cyril G. Hopkins, J. G. Mosier, J. H. Pettit, and J. E. Readhimer. Urbana: University of Illinois, 1912. 14 pages.
5. *La Salle County*, by Cyril G. Hopkins, J. G. Mosier, J. H. Pettit, and J. E. Readhimer. Urbana: University of Illinois, 1913. 45 pages.
6. *Knox County*, by Cyril G. Hopkins, J. G. Mosier, J. H. Pettit, and J. E. Readhimer. Urbana: University of Illinois, 1913. 43 pages.
7. *McDonough County*, by Cyril G. Hopkins, J. G. Mosier, J. H. Pettit, and O. S. Fisher. Urbana: University of Illinois, 1913. 46 pages.
8. *Bond County*, by Cyril G. Hopkins, J. G. Mosier, J. H. Pettit, and O. S. Fisher. Urbana: University of Illinois, 1913. 58 pages.
9. *Lake County*, by Cyril G. Hopkins, J. G. Mosier, E. Van Alstine, and F. W. Garrett. Urbana: University of Illinois, 1915. 52 pages.
10. *McLean County*, by Cyril G. Hopkins, J. G. Mosier, E. Van Alstine, and F. W. Garrett. Urbana: University of Illinois, 1915. 52 pages.
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17. *Kane County*, by Cyril G. Hopkins, J. G. Mosier, E. Van Alstine, and F. W. Garrett. Urbana: University of Illinois, 1917. 60 pages.
18. *Champaign County*, by Cyril G. Hopkins, J. G. Mosier, E. Van Alstine, and F. W. Garrett. Urbana: University of Illinois, 1918. 61 pages.

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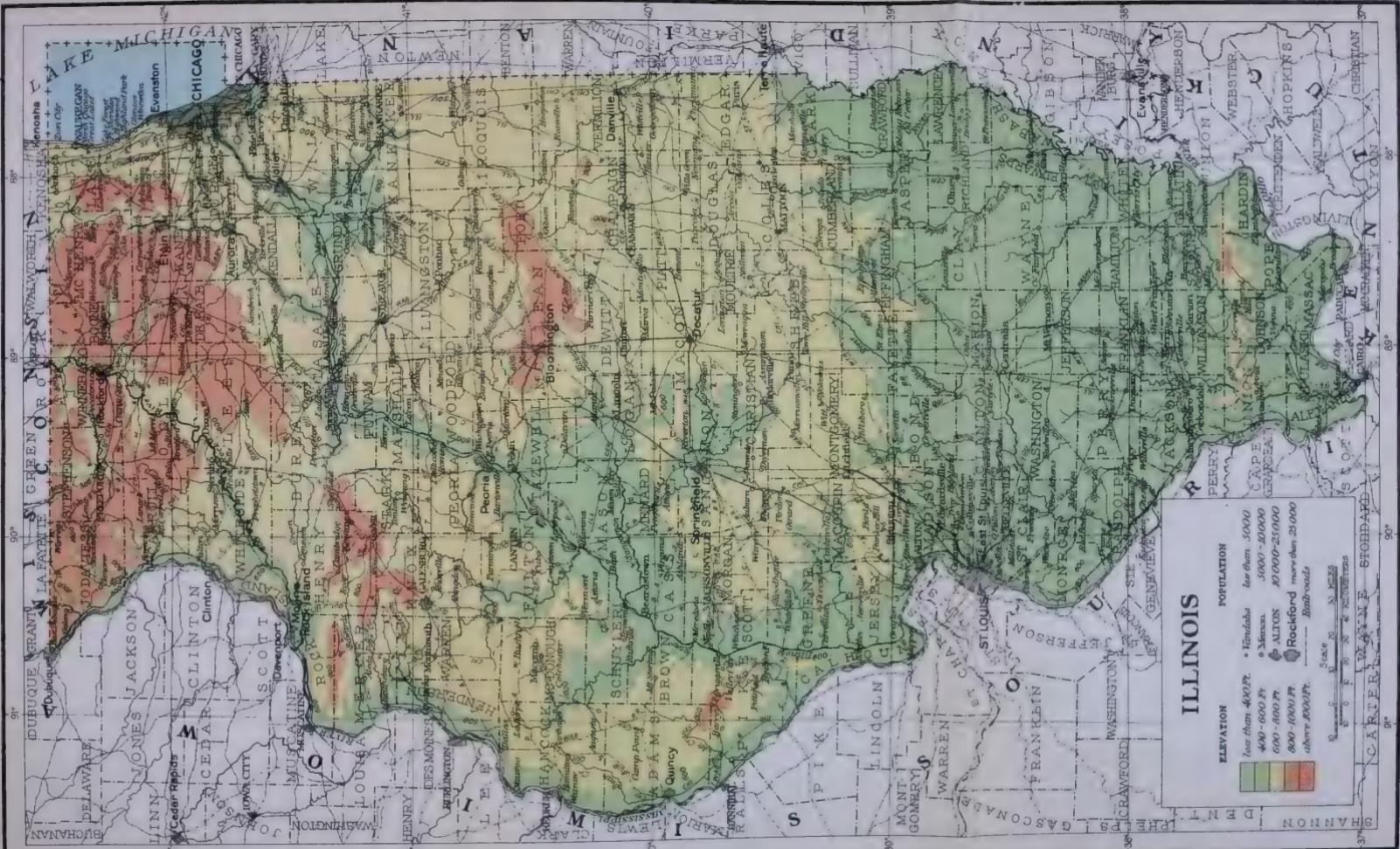
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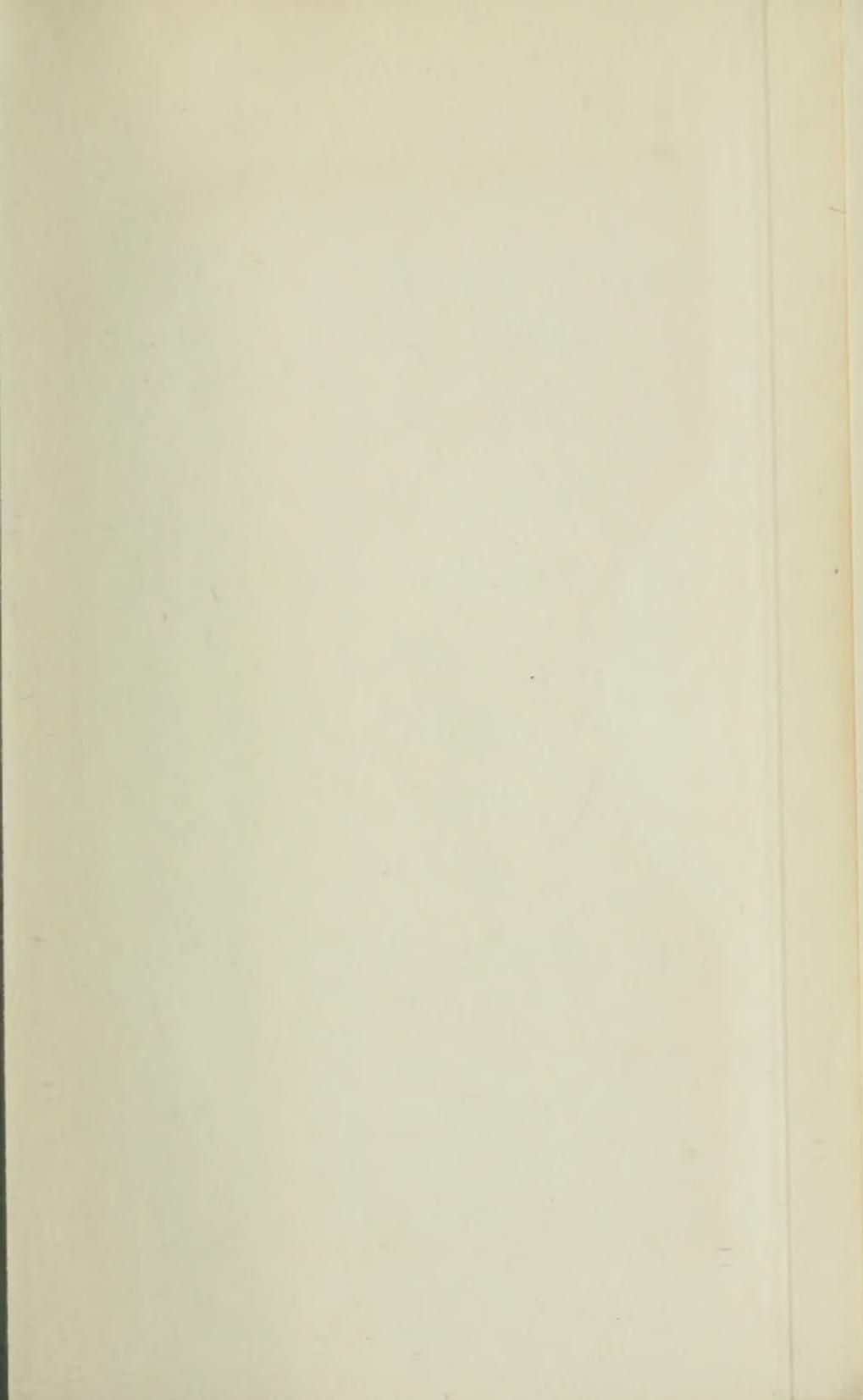
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